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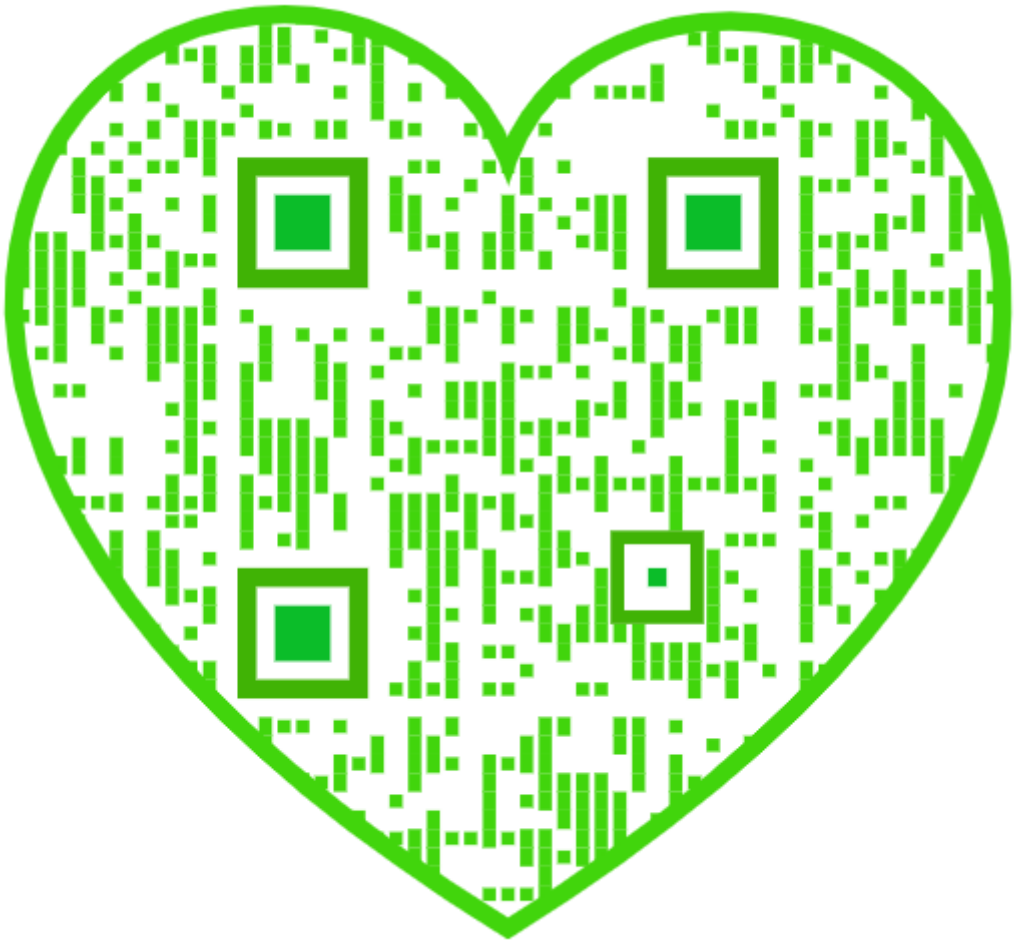
OPHTHALMIC LENSES

BAUSCH & LOMB OPTICAL CO.



Ophthalmic Lenses
AND
Accessories

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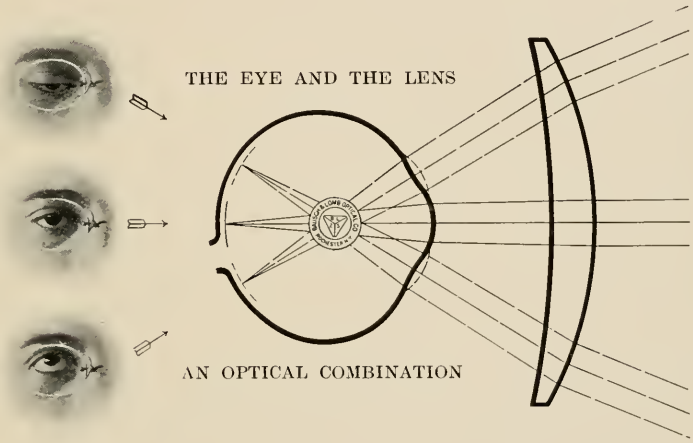
LENSES, FRAMES, MAGNIFIERS
AND READERS



THE EYE AND THE LENS

AN OPTICAL COMBINATION

BAUSCH & LOMB OPTICAL CO.

ROCHESTER, N. Y.

1916
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DESCRIPTIVE

The works of the Bausch & Lomb Optical Company are located in the City of Rochester, State of New York, and cover on the St. Paul Street tract a floor space of about ten acres, with additional buildings occupying a land area of about nine acres on the river flats. The former buildings include the executive offices and main manufacturing plant, while those on the latter site are chiefly devoted to the moulding of optical glass into suitable forms, preparatory to grinding.

The buildings themselves are designed to meet all requirements for the delicate operations involved in optical and mechanical works of precision. The rooms are large and airy, well lighted and heated by a modern blower system with a water cooling device which insures pure air of proper humidity. The plant is also provided with refrigerating machinery, and all machines and buildings are exceptionally well safeguarded for the protection of life and property.

The equipment for the manufacture of the varied lines of optical instruments is of the most modern types known to mechanics. Much of the machinery is designed and constructed by our own experts in our own plant and is the result of an experience of more than sixty years of optical and mechanical endeavor. Owing to the technical character of the industry, all devices undergo constant supervision and inspection in order to maintain the equipment at its highest point of efficiency.

The organization comprises a force of approximately 2,500 employees thoroughly trained in their respective branches. From the computations of the Scientific and Technical Bureaus, through to the intricate mechanical operations, each progressive step is marked by a systematic control until the product reaches final inspection, when our trade mark guarantees the Bausch & Lomb standard of quality.

In addition to the executive offices at Rochester, N. Y., branch offices are maintained and other representatives established in different large commercial centers to provide adequate distribution for our products, not only in America but for the markets of England and her colonics, throughout the continent of Europe and in parts of Asia. The addresses of the different branches follow:

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INTRODUCTORY

Subjective and objective methods for determining errors of refraction require not only skill and experience on the part of the oculist, optometrist and optician, but place a burden of responsibility upon the manufacturer of the apparatus which makes the precise use of these methods possible. Next in importance to apparatus for the accurate detection of errors of vision are lenses to correct those defects.

Ophthalmic lenses are worthy of more studied treatment by the producer than can be accorded them in an ordinary commercial catalog. The outcome of centuries of development, involving the efforts of some of the world's greatest scientists, they constitute a subject, historical and scientific, of especially vital interest to all concerned with optical activities.

It is in recognition of this interest that this catalog has been prepared. In the hope that both trade and profession will value it as a volume of reference, as well as a catalog, we dedicate it to their interests. In it they will find many of the facts and theories of yesterday and to-day, collated in a form more logically compact, perhaps, than they have elsewhere at their disposal.

We began the manufacture of lenses with the foundation of the Company in 1853. Our production is not confined to ophthalmic lenses but embraces all known types, from searchlight reflectors several feet in diameter to lenses of pin-head size used in microscope objectives, as well as high-grade photographic lenses and intermediate forms of every sort. Such extensive experience has naturally given us considerable prestige in the scientific world as lens manufacturers.

With the co-operation of our associates, the world famous optical works of **Carl Zeiss, Jena,** we have been enabled to add to the list of modern lenses two new types—the Punktal and the Katral—and to introduce a series of instruments for ophthalmological use, all of which are made to conform to the most exacting requirements and represent notable achievements of American and European ingenuity.

In this catalog we describe, illustrate and list our complete line of ophthalmic lenses, which we believe to be the most comprehensive in scope of the product of any lens manufacturer, our rubber and zylonite eyeglass frames, our magnifiers and our readers. In another volume will appear our complete line of ophthalmic instruments and optical machinery.

In the following pages will also be found descriptive articles on optical glass, the historical phase of optics and the scientific principles underlying the different types of ophthalmic lenses. For more detailed treatises on these subjects we issue at frequent intervals technical pamphlets under the

caption of "Scientific and Technical Publications." We refer the reader to page 147 for further information regarding this series, as well as other of our publications.

Our optical products are carefully inspected before leaving the works, on the principle that upon a rigid system of inspection and selection depends, in large measure, the true maintenance of a high quality. They are obtainable from the regular distributors of optical goods, whose names we shall be pleased to furnish on request. Questions pertaining to the genuineness of goods offered as of our manufacture will be answered promptly and explicitly.

The trade mark shown herewith will be found on all original containers of our ophthalmic lenses and on all apparatus of our manufacture. The Punktal lenses and our Ultex Onepiece Bifocals also have the trade mark engraved on their surface near the right central margin. While this is so lightly etched as to be best seen with the aid of a magnifying glass, it is important as a guarantee against substitution.

Manifold order books, arranged to simplify the ordering of lenses and other products, will be furnished through our wholesale distributors on request. We also furnish prescription blanks bound in book form, conforming to both the present and the new system of measuring refraction. These blanks are imprinted with the protractor scale adopted by the Naples Convention as the international standard.

Wherever practicable, catalog numbers or letters have been used to simplify ordering and to eliminate errors. These designations should be prefixed "Bausch & Lomb" to insure obtaining the product of our works. Prices are subject to change without notice. For the convenience of the trade the principal articles of our manufacture are also carried in stock at our branches, where they may be inspected and information obtained relative thereto. Our Scientific Bureau at Rochester is also available at all times to aid the user of our goods in solving any technical problems which may arise relative to their use or application.

CHRONOLOGICAL REVIEW OF OPTICS

THE earliest mention made of lenses as an aid to imperfect vision would seem to place their discovery in the last half of the thirteenth century. From two different sources we find Italians credited with their invention in that period. According to the chronicle of the monastery of St. Katherine in Pisa, they were the invention of one of the monks, Alessandro della Spina, while Salvino d'Armato, called Armati, of Florence, is also credited with their introduction. But lenses were in use in Germany before that time, and the Chinese were probably grinding them from a transparent mineral substance at a still earlier date.

The first lenses seem to have been of the convex form only. We find among the ancients no reference to diverging lenses, although short sight was well known as a defect of the eye. It is not until the end of the seventeenth century that we learn of concave lenses being ground.

A most important period in the history of optics is that between the years 1666 and 1669, during which time Newton conducted his famous experiments upon the composition of light. He found that white light is composed of light rays of different colors, and was the first to decompose white light by the prism and to recompose it. White light is dissociated into its component parts by the prism because the different colors of which it is composed are unequally refracted. During the centuries that succeeded many investigations by noted scientists followed the work of Newton, and with the establishment of definite data the way was gradually paved for further improvements in optical lenses and apparatus.

In 1804 Dr. Wollaston effectively advocated the use of meniscus formed spectacle lenses of suitably combined curvatures, instead of the ordinary double and plano-convex and concave types. He named them periscopic lenses, because with the concave surface nearest the eye better vision and a wider field of view resulted. It has since developed that meniscus lenses had already been recommended for spectacles by the German mathematician, C. G. Hertel, in a booklet published in 1716.

In the latter part of the year 1800 the existence of astigmatism in the eye was brought to public notice. A very important contribution to our knowledge of the subject was made in 1825 by the English astronomer, Airy, who first corrected this defect in his own eye by means of a sphero-cylindrical lens, made under his direction by the optician, Fuller, of Ipswich.

The results of the celebrated dioptric investigations of the German mathematician, Gauss, were announced in the latter part of the year 1840. In these investigations he established in comparatively simple

form a general theory of refraction through centered lenses and lens systems, at the same time having exact regard to the thickness and separation of the lenses. He introduced the now well-known principal points and planes.

The first record of the use of toric lenses occurs, as nearly as can be learned, during the period 1840–44. It is stated by Dr. Javal that the Roman optician, Suscipi, is reported to have applied them at that time for the correction of astigmatism, one lens surface being convex spherical and the Toric concave surface being placed toward the eye.

In 1845 followed the important discovery of the well-known nodal points in lenses by Prof. Listing. These nodal points are of special interest in the study of the eye; when a lens or lens system of definite thickness is surrounded by the same medium, as air, they coincide with the two principal points of Gauss.

Through the important invention of the ophthalmoscope in 1851 by Prof. von Helmholtz, the ophthalmometer with plane parallel plates in 1854 and the telestereoscope in 1857, by means of which increased stereoscopic effect is obtained, new instruments of the greatest value became available for the examination of the eye and the study of vision.

In 1866 the employment of the metric system for measuring and designating the power of lenses was advocated by the ophthalmologist, Nagel, in place of the old English inch system then in use. The term "diopter," proposed by Monoyer, of France (written in English "dioptry" also "dioptre"), is now universally used as a unit in the metric system of numbering and designates the dioptric or refractive power of a lens of one meter (39.37 inches) equivalent focal length.

In the year 1873 appeared an announcement made by Prof. Abbe, of Jena, Germany, of his theory on the formation of images based on the wave theory of light and having special reference to optics of the microscope. Through extensive research work the basis was laid for many of the remarkable improvements in optical instruments made in later years.

It was in 1878, when we entered the general American lens market, that we standardized the concave curve of the periscopic lens—which had been made of variable radii for the scale of foci, and thus made possible the later development of the cement bifocals. Beginning at that time, we devoted our efforts to the establishment of lens standards now recognized as "Bausch & Lomb Quality."

Through the establishment of the celebrated works of Schott & Genossen in 1884, the new Jena glass became generally available throughout the world. A new era in optics was opened, in which the ingenuity and scientific applications of all interested in furthering optical progress found its freest scope.

For ophthalmic lenses in general no apparent benefit resulted. The glass already available was fortunately of an excellent quality for the purpose.

The method of examination of the eye for refractive errors was in the meantime very much facilitated by the completion of new apparatus for the purpose, among which was the well-known Javal-Schioetz ophthalmometer invented in 1882. This instrument was constructed on a different principle from that of the before mentioned ophthalmometer of Helmholtz and was further improved by the inventors in 1889.

In the years from 1889 to 1904 important communications on the subject of lens improvements were presented by Dr. F. D. Ostwalt, Dr. M. Tscherning and also by Dr. Percival. Let us remember that in connection with all of these investigations, the importance of taking into consideration the center of rotation of the eye is emphasized.

In connection with the study of lenses, a valuable contribution to the subject of ophthalmic prisms was made in 1890 by C. F. Prentice. He proposed the now generally accepted designation of "prism dioptry" as a unit to express the refractive power of a prism, which produces a tangent deflection, or deviation of one centimeter (1/100 meter) at a distance of one meter.

In the year 1893 appeared the important work on "The Theory of Optical Instruments According to Abbe," written by Dr. S. Czapski of the Zeiss Works. In this treatise, as also in the later works of Drs. Czapski and M. von Rohr and their associates on the scientific staff of the Zeiss Works, the results of many years of epoch-making investigations in the field of optics, carried on by Prof. Abbe and his collaborators, have been freely placed in the hands of those interested in the subject.

Prior to this, in 1891, a valuable contribution had also been published on the theory of astigmatism by the Swedish ophthalmologist, Gullstrand, who since then has greatly aided in advancing ophthalmological progress by conducting important mathematical and optical research work.

With the advent of the twentieth century, it is noteworthy that the use of periscopic lenses, which had been introduced by Dr. Wollaston about one hundred years before, received a new impetus through the extended application of deep curved forms. This led to their designation as meniscus lenses, to distinguish them from the earlier periscopic forms.

Through the introduction of improved methods for manufacturing meniscus and toric lenses, it has become possible to render more generally available the valuable properties possessed by these types for the correction of astigmatism. The increase in their use has been correspondingly marked. We commenced the manufacture of the meniscus types in 1896 and the toric forms two years later.

About 1784 Benjamin Franklin had a pair of spectacles made, each lens

consisting of two half ovals, the upper one being concave, and the lower convex. This was the origin of the bifocal lens now so widely used.

Since the use of bifocals by Franklin, numerous inventions have led to the perfection of these useful lenses. The solid bifocal with prisms of the weaker or distance power, base down, and the reading portion, base up, was extremely annoying to the wearer and was followed by the split bifocal, consisting of two pieces joined in the center but capable of being centered in each half lens independently. These lenses did not prove very popular.

In 1888 August Morck invented the cement bifocal, consisting of a periscopic lens, to the concave curve of which was cemented a thin glass segment finished to the corresponding concave curve of the major periscopic lens and ground to the regular focus on the other side, then cemented to give the desired reading addition. These lenses have been in popular demand and are extensively used at present.

The so-called Perfection Bifocal followed shortly after; a major lens was cut out in the lower portion, either semi-circular or crescent-shaped, and a segment of stronger focus, cut from another lens, inserted. These lenses could also be centered and used in either frames or rimless mounts, in which latter case they were cemented.

Another cement bifocal known as "Opifex" has become popular. The segment is ground to a "knife edge" and is as nearly invisible as it is possible to make a cemented bifocal lens. Many other inventions in bifocals are recorded, but few have attained the practical stage of existence.

The Kryptok lens was later introduced and met with immediate favor. The major lens of crown glass has a depression ground in the lower portion. Into this depression is counter-sunk a piece of glass of different refractive index, usually a flint disc. The two pieces are then fused together and ground and polished, making a perfectly homogeneous, as well as an invisible bifocal lens.

The latest invention in bifocal lenses, however, is the Onepiece, which is a solid or one-piece bifocal lens, patents for which have been granted in the United States in 1906, 1909 and 1910. These lenses are ground and polished both in the upper and in the lower portions, absolutely free from the disturbing prismatic effect attributed to other bifocal lenses ground from one piece of glass. It is possible to make them with a large reading portion, but the greatest claim made for them is their absolute freedom from disturbing color or chromatic aberrations.

Among the recent investigations in the field of ophthalmic lenses, the work carried forward by Dr. Gullstrand and Dr. M. von Rohr is especially worthy of note. In 1912 Dr. von Rohr published in his work, "Das Auge und die Brille," the result of his investigation regarding the importance of the center

of rotation of the eye and the relation of this center of rotation to the correction of refractive errors by means of ophthalmic lenses.

The work of Dr. Gullstrand and Dr. von Rohr resulted in the accomplishment of notable achievements, both in the improvement of apparatus for testing errors of vision and in ophthalmic lenses, with special reference to deep curved lenses.

In all deep-curved lenses, Meniscus and Toric, the one surface is ground to a standard curve. A curve of six diopters has been adopted as the standard by American lens manufacturers, although other curves have been used. While in the weaker foci of these lenses the lens correction is of lesser importance, in the great number of powers there is a certain amount of astigmatism; it was for the correction of this astigmatism and the perfecting of the deep curved lens that Dr. von Rohr published his extensive investigation referred to above. He desired to correct the astigmatism marked towards the marginal portion in all foci and computed the power of each lens and its correction separately. These lenses, resulting from the work of Dr. von Rohr, were named by him "Punktal" and "Katral." These words are registered as trade marks in the United States by the Carl Zeiss Works, and we, as their associates, hold the exclusive manufacturing rights for the lenses on the American Continent. (See pages 75 and 80.)

By the present method of refraction test lenses, double convex and double concave in form, have been and are still used. Since the more general adoption of deep curved lenses, many irregularities, especially in the stronger powers, have resulted from the fact that the principal points of the two forms of lenses do not coincide. The reader is referred to page 36 of this volume and to our recent publication, "The Substitution of Meniscus for Flat Ophthalmic Lenses and a New System of Designating Their Powers," for more detailed information on the subject.

It is a notable fact that optical literature in general, since the beginning of the century, has been enriched by the contributions of the physicists, mathematicians, ophthalmologists and opticians of Europe and America. In addition to the larger works in optics, there has also accumulated a vast fund of short essays and articles in the professional and trade journals of both continents, freely conveying for the benefit of all the experience of the many workers in a most useful branch of human endeavor.

THE THEORY OF LENS ACTION

In commemoration of the ninth annual convention of the American Optical Association, in 1906, we published a treatise on "Lenses." This little book has met with such favor among the optical trade and profession that we have received frequent requests for copies during the intervening years, while one chapter, entitled "The Theory of Lens Action," has even been republished by others. In light of these considerations and the general value of the matter itself, we have thought best to reprint this chapter here in order to preserve it in more definite reference form. The chapter follows in full:

"Before inquiring into the nature of lenses and their action, it appears desirable to obtain some notion of the agency upon which they act, namely, of light itself. To arrive at this, we must betake ourselves, for the moment, into the realm of the imagination, into a domain of abstractions and hypotheses. But in doing so, we must not make the hasty conclusion that the results so found are of no value, or what is worse, of imaginary value only. On the contrary, the assumptions which we introduce have been employed for hundreds of years by our ablest and boldest intellectual giants and have led them to truths of unimpeachable character, truths which belong to the most priceless possessions of mankind and have brought us, as nearly as may be, to a glimmering of the unknowable, to a conviction of the unity of the universe.

"Let us imagine, then, that all space, the entire universe in its outermost and innermost depths is permeated by a medium or substance which we know only through its manifestations, and which, for want of a better name, we call *ether*. At any point in this hypothetical or imaginary substance which we assume as penetrating all matter, suns and atoms alike, conceive, now, a disturbance set up, a disturbance of such a nature that the particles of ether about the point in question are thrown into violent and rapid agitation. Suppose, further, the ether endowed with qualities which enable it to transmit this agitation to the neighboring particles, that is to propagate the disturbance in all directions in the form of waves, much as, when we throw a stone into a quiet pool, we see the ripples and waves travel outward in every direction. Then according as the rapidity of the movements of the ether particles reaches or exceeds a certain limit, we shall have either the electric waves of wireless telegraphy or those waves which, impinging upon the eye or the photographic plate, we recognize as *light*. The science of light in all its forms is our familiar and cherished science of *optics*.

Fig. 1

"Leaving aside certain phenomena, which are scarcely of interest here, we may say, what all will probably admit, that light travels in straight lines; we cannot see around a corner. This is the first fundamental law of optics.

"The second fundamental law of optics concerns itself with the speed or velocity at which light travels.

"In inter-stellar space, in the regions beyond our earth, light travels at a rate quite beyond our minds to grasp. Experiments of extraordinary delicacy and precision have proven beyond a doubt that this speed is 186,000 miles per second; in other words, could a ray of light be made to pass around the earth, it would circumnavigate the same more than seven times every second. Incidentally we may mention that electricity travels at the same speed as light, forcing us to the conclusion that light and electricity are, in the last analysis, identical. The recognition of truths like these is the highest recompense of men of science.

"But exact experimentation has done more than this. Actual measurements have shown that the velocity of light is different in different substances; we may say, light travels slower the denser the medium or substance through which it is passing; in ordinary crown glass it travels slower than in air, in ordinary flint glass it travels slower than in crown. And the second fundamental law of optics is, that the ratio or quotient of the velocities of light in any two given media or substances is invariably the same number; this number we may call a natural constant, a quantity which nature has predetermined and has permanently attached to the substances in question and which, so far as the phenomena of light are concerned, completely characterizes those substances relative to each other. This quantity or number, whose importance in optics is manifestly second to none, has received the name of *Refractive Index* or Index of Refraction.

"As an example we cite: Light travels at the rate of 186,000 miles per second in air, 122,000 miles per second in ordinary optical glass; 186,000 divided by 122,000 is 1.53, which is the refractive index of this glass, referred to air as standard, air having the refractive index 1.00.

"Having thus briefly reviewed the properties of light itself, let us turn from the abstract to the concrete and examine the simplest case of light-action, viz., the action of a plane glass surface on a beam of light.

"We have said before that light travels in straight lines in the form of waves, generally spherical, by which we mean that the light disturbance, starting from a radiant center C (Fig. 2) successively reaches at definite times the points P Q R, located on a line drawn from this center, and that all points as P′ and P″, Q′ and Q″, R′ and R″, situated on the wave surfaces of P, Q, R respectively, are reached in the *same* time. These lines C R, C R′, etc., which

give the path of the light, are termed *rays* and hereafter we may often confine ourselves to them, leaving the waves out of consideration.

"When the wave motion has traversed a considerable distance, as for example, in coming from the sun, the outermost wave-front, R′ RR″ (Fig. 2)

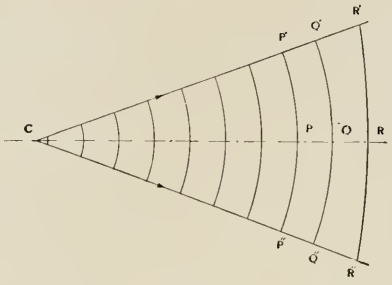


Fig. 2

will evidently be much flattened, so that we can safely assume the portion of it that we are considering to be plane. Imagine such a plane wave-front, R′ R R″, (Fig. 3) striking a plane surface of glass obliquely. Then the light traveling along the ray P″ R″ will enter the glass sooner than that along the ray P′ R′ and will, consequently, since light travels slower in glass than in air, be

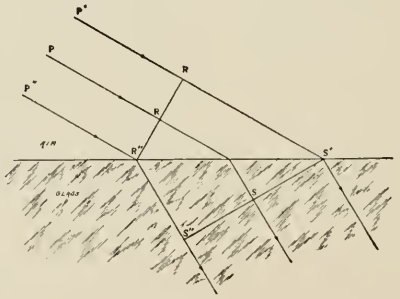


Fig. 3

retarded or commence to travel slower, before that along P′ R′ does. During the time the light has traveled from R′ to S′ in air, it has only traveled from R″ to S″ in glass.

"Now experiment has shown, and mathematical analysis has demonstrated, that a ray falling thus obliquely on a glass surface is deflected or bent from its original direction P″ R″ (Fig. 4), and in such a sense that it approaches the perpendicular or normal N N′ drawn through the point of incidence R″. Carrying out this for all points of our original incident wave-front, R′ R R″ (Fig. 3), we obtain the resultant, so-called refracted wave-front, S′ S S″, and have before us the phenomenon of *Refraction.*

"Again we find, as one of Nature's laws, a remarkable fixed relation between the angles made by the incident and refracted rays with the perpendicular or normal to the surface, or rather between certain quantities or numbers called

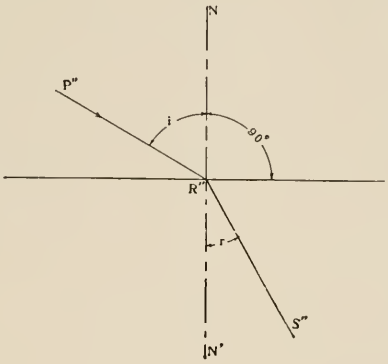


Fig. 4

sines which fix the size or magnitude of those angles. This law may be enunciated thus:

"The ratio or quotient of the sine of the angle of incidence i (Fig. 4) and the sine of the angle of refraction r is invariably the same number for two given substances or media, namely the same number which we have seen above to be the *Index of Refraction*. By means of this simple law, the path of a ray of light through any number of refracting substances may be calculated.

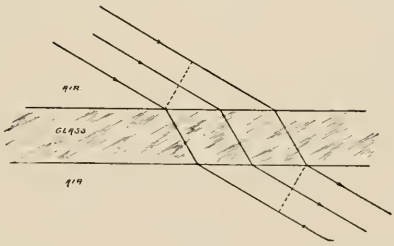


Fig. 5

"If, after passing through a thickness of glass, the beam strikes a second plane surface separating it from air, as in a plano-parallel plate (Fig. 5), the beam will be again deflected to the same extent but in a sense opposite to that at the first refraction. The beam as a whole is shifted laterally. If the second plane surface is inclined to the first surface as in prism (Fig. 6), the *direction* of the incident beam will be changed and to an extent depending on the angle of the prism. This is immediately apparent from Fig. 6. Turning

FIG. 6

now to curved refracting surfaces, we note that any very small portion, as A B (Fig. 7) of the same, may be regarded as a plane, whence we may immediately apply our laws for plane surfaces as found above.

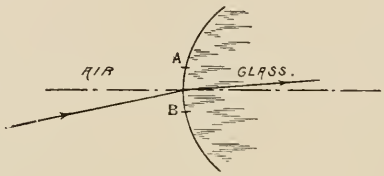


FIG. 7

"Suppose a second curved bounding surface (Fig. 8) forming, as is well known, a *lens*. Then, as shown in Fig. 8, we may imagine the whole lens divided into small prisms or prismatic elements and the results found in the case of prismatic refraction are applicable. The rays or beam of light *a b*, falling perpendicularly on the central portion of the lens, go straight on; the beam *c d*, falling obliquely, is deflected.

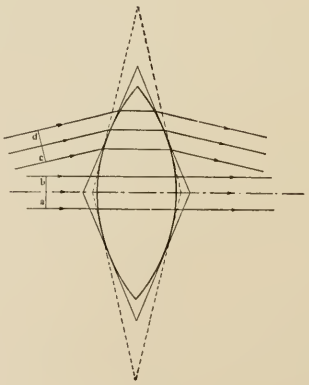


FIG. 8

"We are now in a position to take a final step in our study of lenses, and that is, to consider the *power* of a lens and its allied term, *focal length*.

"The word *power* naturally leads to the word *work*, power being in general

the capacity of doing work; power is produced for the sake of the work it can perform. What 'work,' we may ask, does a lens do?

"We have just seen (Fig. 8) that when a light wave coming from a distant source falls upon a lens, the *direction* in which the various parts of the wave move is altered. If we look more closely, if we trace the action of *all* the elementary prisms into which the lens is conceived to be divided, we shall see that the *form* or curvature of the wave-front *as a whole* changes in its passage through the lens, in as much as those parts of the wave that pass through the center of the lens have a greater thickness of glass to traverse than those passing through the edge, and, travel being slower and more difficult in glass than in air, are belated with respect to the marginal rays. For instance, by the time the light along B L (Fig. 9) has just emerged from the lens at O,

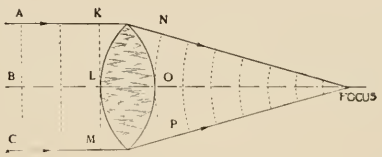


Fig. 9

the light along A K has regained its freedom and has already reached the point N at some distance from the lens. The original plane wave-front A B C is thus transformed into a curved wave-front N O P, with the rays having their center at F.

"The point F, toward which the emergent light converges, is the *Focal Point* or *Focus* of the lens.

"The 'work' of the lens consists in forcing the wave to assume a different shape or in causing the light to converge toward the focus, instead of, as originally, diverging from the distant source. The amount of this change of form of the wave is a measure of the 'power' of the lens and depends on the curvature of the lens surfaces and the lens material. The stronger the curvatures of the lens surfaces, the more will they alter the shape of the wave-front, the nearer, as a rule, will the focus lie to the lens.

"In order to characterize a lens, it is needful to look about for a measure of its strength or power. The direct measurement of the wave curvature is impracticable; the focal point on the other hand, has, in general, a real existence and can be actually located by placing a screen so as to receive upon it the image of a distant object, and the *size* of this image, is, as we shall now see, the true measure of the power of the lens.

"From the above it will be clear, and by the simplest kind of experiments we can easily convince ourselves, that the less curved the lens surfaces are,

the farther away from the lens will the image of an object lie and, as is evident from Fig. 10, the *larger* will this image be. To avoid the necessity of choosing an object at a definite distance, we assume one at a very great or infinite dis-

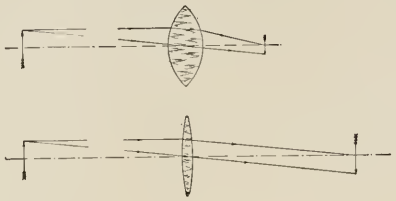


Fig. 10

tance, in which case its size can of course be expressed only in angular measure. See Fig. 11.

"Then we define the power of a lens as the ratio of one-half of the apparent size of a distant object A B expressed as an angle, to one-half the real size of

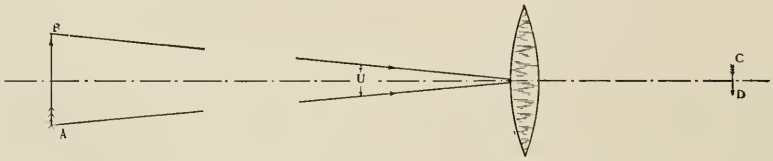


Fig. 11

the image C D of this object, the angle being measured, not in degrees, but by a certain mathematical quantity called 'tangent,' which fixes its magnitude and of which tables have been computed.

"We have thus brought the power of a lens into relation with its every day use, which is to produce images at given points and of a given magnitude, and have shown further that power is a physical attribute of the lens, that it cannot, as it were, be measured with a yard stick but has a greater and deeper meaning than a mere length.

"The power of a lens is often, but sometimes erroneously, measured by the distance of the focus from the lens, or as we may say, by the '*back focal distance*' C F (Fig. 12). If we compare two lenses of different forms (Figs. 12 and 13) but so constructed as to give images of the same size and consequently

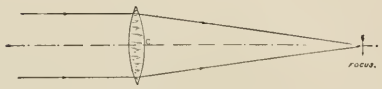


Fig. 12

Fig. 13

having the same power, we note that the 'back focal distance' is entirely different in the two cases, showing at once that this distance is *not* the true measure of power. The true measure of power is found by measuring the *size* of the image and the apparent size of the object and finding the ratio mentioned above.

"If we divide unity, that is one, by this ratio, we find the reciprocal of the power and have what is known as the true or *equivalent focal length;* this is, as we have seen, not at all the same as the 'focal distance,' often called 'back focus.' In case we feel the necessity of measuring off this true focal length in the neighborhood of the lens, we ought not to start *from* the lens, but should take as our starting-point the focal point itself and measure toward the lens, to the first, or primary, principal point. For the focus is the only point connected with the lens which has any real existence. The somewhat cumbrous expression, equivalent focal length, is frequently abridged to *focus.*

"The oft mooted question, from what point is the focal length to be measured, is thus simply answered: *From the focal point to the corresponding principal point.*

"As in other branches of applied science, it is essential to have a standard lens, a lens to which, as regards power, all lenses may be referred. The standard or unit which has been almost universally adopted is, as is well known, a lens having a true focal length of one meter, its power being termed Diopter or Dioptrie.

"The kind of lenses most generally used have spherical surfaces, and they can be divided into two groups; the first group, thicker in the middle than at

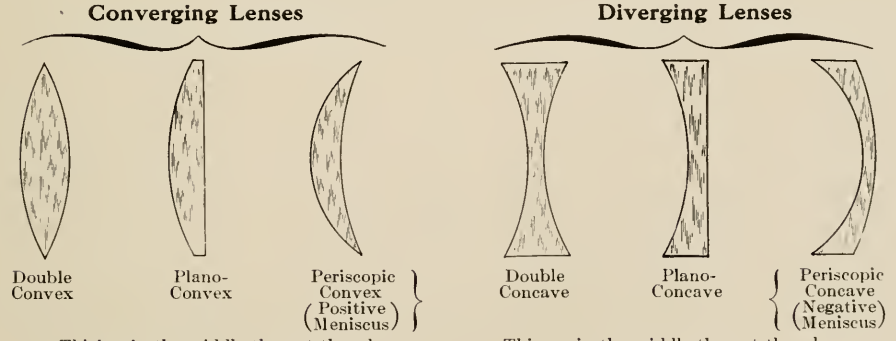


Fig. 14

the edge, have a convergent effect on the rays of light; the second group, thinner in the middle than at the edge, have a divergent effect. These different forms are shown in Fig. 14.

"The positive and negative menisci, also called periscopic convex and periscopic concave lenses respectively, are useful in cases where a large field of vision is desired.

"We have so far considered lenses with spherical surfaces only, and now turn our attention to those bounded by surfaces whose curvatures vary in different directions.

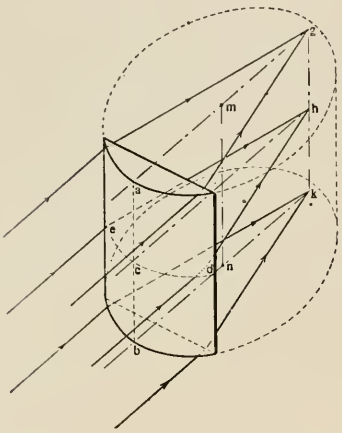


FIG. 15
Action of Plano-Cylindrical Lens on Parallel Rays

"For certain defects in the eye spherical lenses no longer suffice, and it has been found that glasses having cylindrical surfaces aid in correcting these errors. With such lens-surfaces the best effect is produced in but one 'meridian,' namely in the 'meridian' or plane at right angles to the so-called 'axis,' *a c b* in Fig. 15 assumed in the middle of the lens, and called 'axis' because parallel to the axis *m n* of the cylinder of which the lens surface is a part. This effect is due to the peculiar nature of the curvature of the cylindrical surface and the lens action is convergent or divergent according as the surface is convex or concave. In the plane *a m g k n b*, passing through the axis *a b c*, rays are refracted without change in direction, this part of the lens having the same effect as a plane-parallel plate. It is evident that the image of a distant luminous point formed by this lens will be a luminous line *g h k*.

"Where it is desirable to have the combined effect of a spherical and a

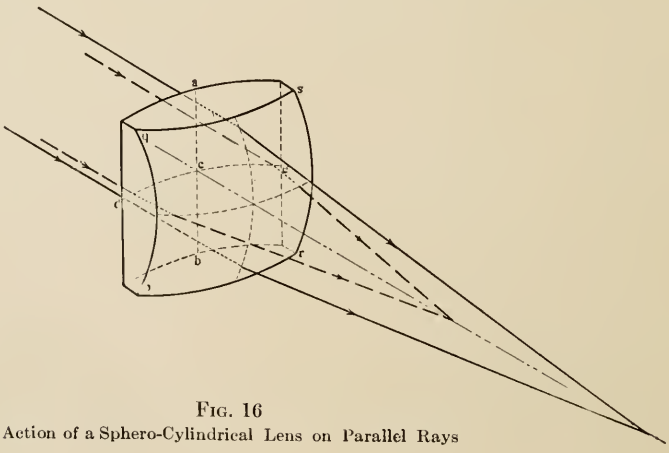


FIG. 16
Action of a Sphero-Cylindrical Lens on Parallel Rays

cylindrical lens, lenses having one surface spherical and the other cylindrical are employed, and applying the before-mentioned principles we can readily gain an insight into their mode of action. In Fig. 16 the action of such a sphero-cylindrical lens on a beam of light is shown; *p q s r* represents the spherical surface, and *a c b* indicates the axis of the cylindrical surface; it is apparent that in one meridian the spherical and the cylindrical surfaces work together, while in the meridian containing the axis *a c b* only the spherical component acts.

"In addition to the general forms of spherical and cylindrical lenses there has come into use in recent years, although known of long before, a type of lens having a toric surface. These toric lenses, as they are called, have come into favor where the advantage of the periscopic principle in connection with cylindric effect is sought. From the nature of the curvature of the toric surface, which possesses different radii of curvature in different meridians, as is shown in Figs. 17 and 18, it is evident that the manufacture of accurate toric

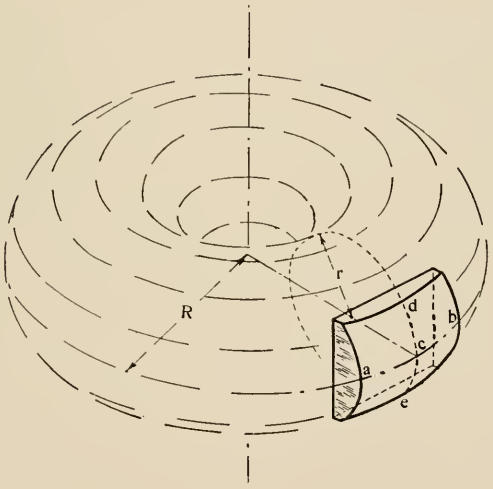


Fig. 17
Perspective View of Toric Lens and Torus

lenses offers many difficulties. Fig. 17 presents a perspective view of a torus. The plano-convex lens shown may be considered cut out of this torus and having the 'meridians' *a c b* and *d c e*.

"In Fig. 18 are shown sectional views through the vertical meridian *d c e* and the horizontal meridian *a c b* of a plano-convex toric lens, indicating how the refraction of the parallel rays varies in these two meridians. The dotted outline shows how the torus may be generated, *R* and *r* being the radii of

curvature in their respective meridian planes; when r becomes equal to R it is evident that a spherical surface will result.

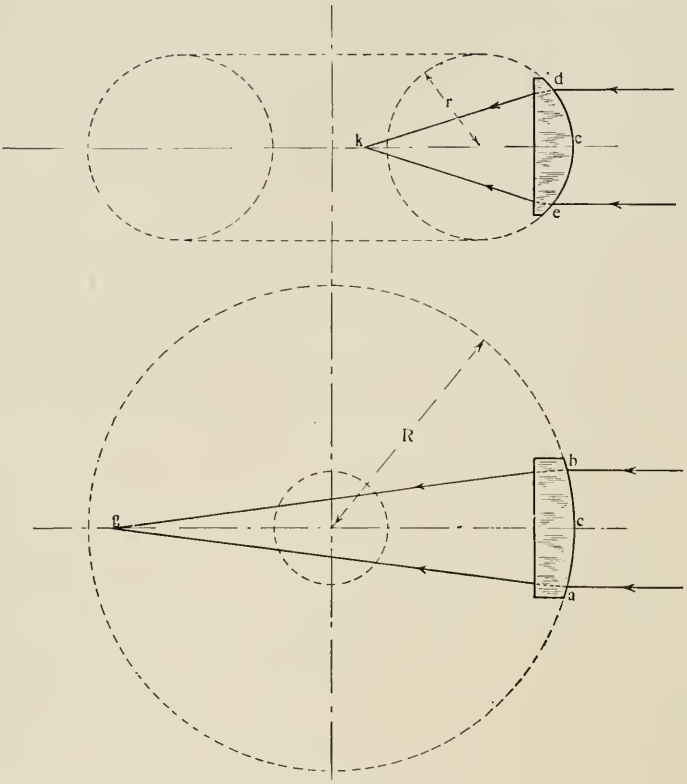


Fig. 18
Sectional Views of Toric Lens and Torus

"In the use of glasses the inconvenience often arising from requiring lenses of different focus for near and distant vision has lead to the introduction of a variety of forms of double focus lenses, now well-known as 'bifocals,' the principle of their construction being to have the upper portion of the lens of different power from the lower."

OPTICAL GLASS

Glass is the most important substance with which the optometrist or optician is concerned in his work, whether in the manufacture of optical instruments or in the practice of optometry. The science of optics is the science of light. Without the art of glass making, however, scientists, ancient and modern, would have found it difficult, if not impossible, to control the action of light to meet the solution of the mathematical problems confronting them in the study of light phenomena.

While it is true that other substances have been used to bend the rays of light, glass is universally accepted as the best material known for the purpose. Thus the optician and the glass maker have contributed jointly to the science of optics, to the benefit of posterity.

Glass is an amorphous, transparent or translucent mixture of silicates by definite chemical formulæ. The essential materials for glass making are silica, an alkali and lime or lead. Part of the lime or lead may be replaced by oxides of other metals, also by certain borates and phosphates to replace a part of the silica, especially in glass manufactured for optical purposes.

Before the era of modern optical glass manufacture there were only two types of glass available to the optician, the one a lime glass with a low refraction and small dispersion (crown glass), and the other a lead glass with a relatively high index and large dispersion (flint glass). Although the terms "crown" and "flint" are still used, they have no definite meaning to the optician of to-day, as in late years the glass manufacturers, in answer to the demand of modern optics, have succeeded in putting upon the market so many new varieties that there is no longer the sharp division between the two kinds. It may be interesting to state here that in the last catalog of Schott & Genossen there are listed *one hundred* different varieties of optical glass.

The requirements demanded of glass for ophthalmic lenses, while stringent, are not so many as those required for glass to be used in other optical instruments. Glass for ophthalmic lenses must be hard, durable, homogenous, free from bubbles and striæ, but also of a constant index of refraction. The crown glass we employ in our products has an index of 1.523 and a dispersion of approximately 58.5. With the introduction of the deeper forms of lenses the moulding of glass has been introduced. The process carried on in our works insures, under our rigid inspection, the proper annealing and freedom from other glass defects.

Roentgen glass is a transparent glass which the Roentgen or X-ray cannot penetrate. Lenses produced from this material offer protection to the patient, physician or operator while exposures with the X-ray are being made.

Colored glass is used to moderate the amount of light which enters the eye. Such glass is produced by adding metal oxides to the mass of melted material; cobalt-oxide giving the blue; chrom-oxide, green; gold-oxide, ruby; silver-oxide, yellow; manganese-oxide, violet. Smoke glass is produced by using several of the above-mentioned oxides.

Light when passing through glass will, generally speaking, suffer a reduction in intensity. The light lost in transmission is said to be absorbed, and the extent thereof is the intrinsic absorption of the glass. The volume of the light transmitted is said to be the intrinsic transmission of the glass. It has been satisfactorily proved that lost light is changed to heat.

All glasses do not have the same absorption for the same color, nor does any one have the same absorption for all colors. Thus one specimen might pass a great deal of red and green and absorb nearly all blue light, while another might pass a great deal of green and blue and absorb nearly all the red light of the spectrum. Such absorption of particular colors or groups of colors is called *selective absorption*. A glass which absorbs equal proportions of all colors of light is called a *neutral glass*. It serves the purpose of reducing the intensity of light without altering its color.

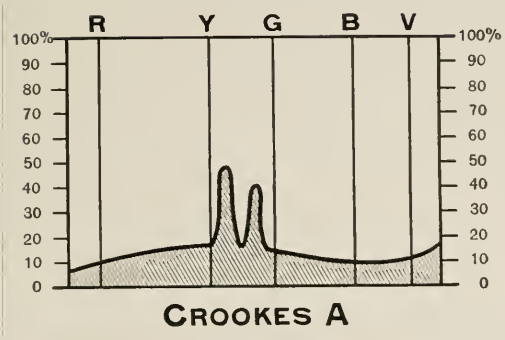
Since absorbed light is entirely lost, the color of a piece of glass will be determined by the colors of light transmitted by it. If one looks at an object through a colored glass and the object gives off light only of the colors absorbed by the glass and in the proportions absorbed, the object will appear black. If the object gives off light only of the colors transmitted by the glass and in the same proportions as transmitted, there will be no change in the color of the object. If the object gives off light, some of which is absorbed and some of which is transmitted by the glass, the object will seem to have only the colors transmitted by the glass.

If for any reason it is desired to suppress any particular color or colors of light in any proportions, it is necessary only to pass the light through a glass, the intrinsic absorption of which is in keeping with the requirements. We have prepared charts showing the relative intrinsic absorption of visible light of the colored glasses commonly used for ophthalmic lenses. The height of the rectangle represents 100%, and the vertical lines indicate the various colors of the spectrum—red, yellow, green, blue and violet. The portions of the vertical lines below the curve indicate absorbed light, and those above indicate transmitted light. Thus, for example, the absorptions for Euphos A are:

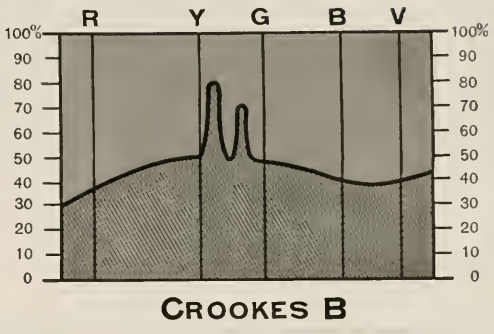
Red	32.4%	Green	3.8%	Violet	41.5%
Yellow . . .	8.8%	Blue	25.0%		

The transmission for each color is, of course, 100%, minus the per cent of absorption for the color under consideration.

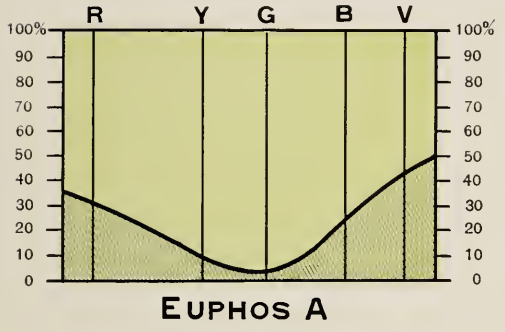
COLOR AND ABSORPTION CHART—I



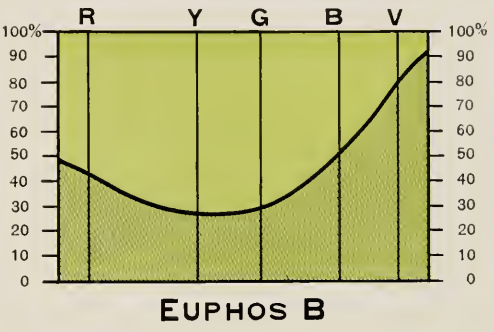
CROOKES A



CROOKES B



EUPHOS A



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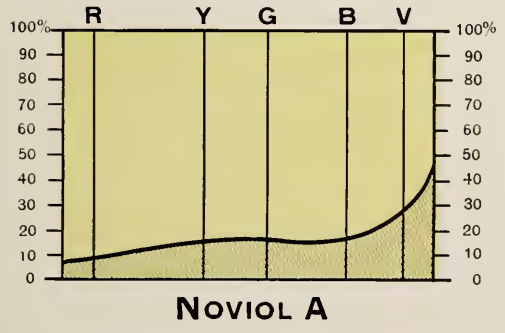
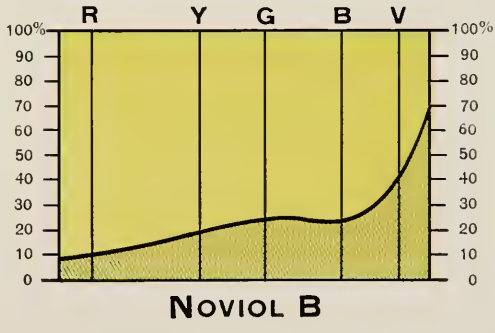


NOVIOL A



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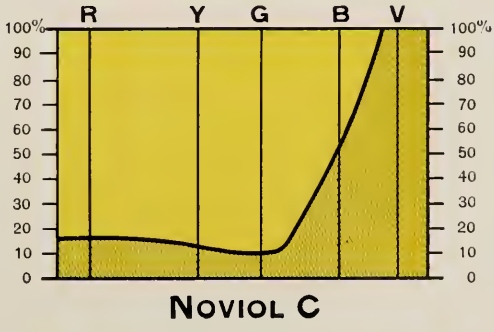
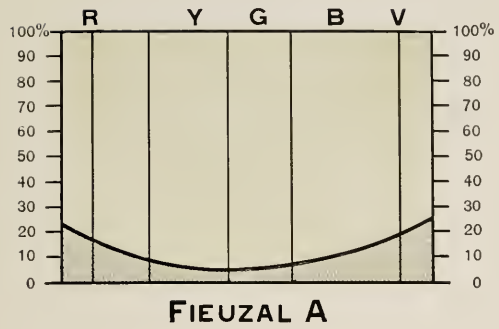


NOVIOL C

COLOR AND ABSORPTION CHART—II



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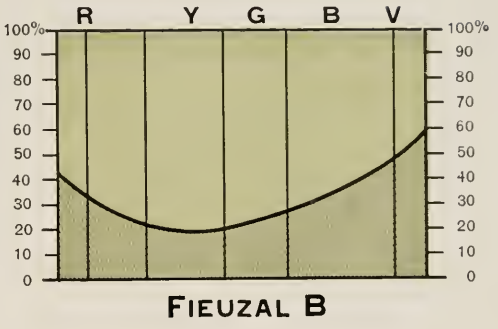

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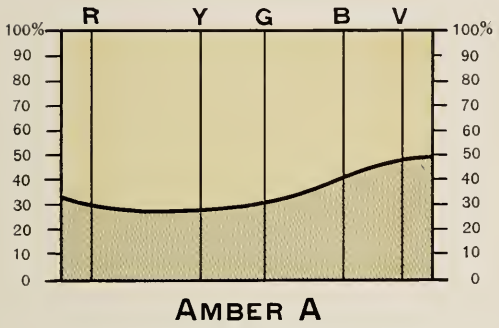
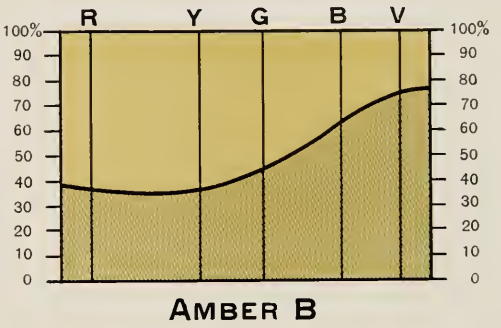


AMBER A



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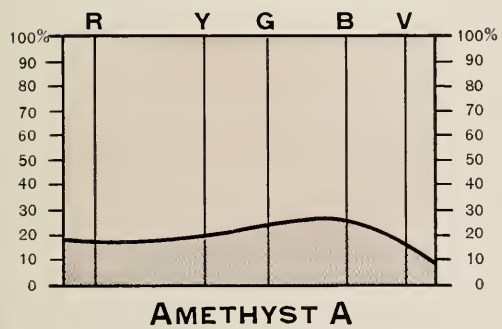
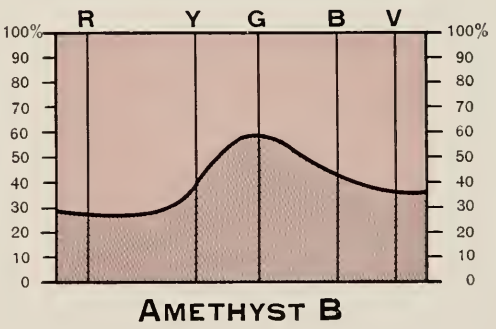
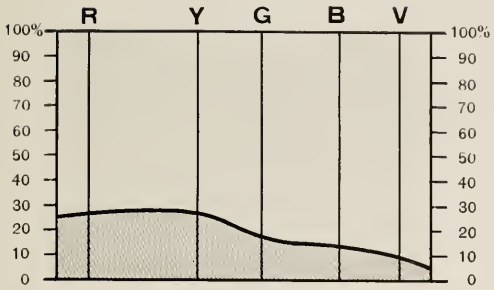


AMETHYST A

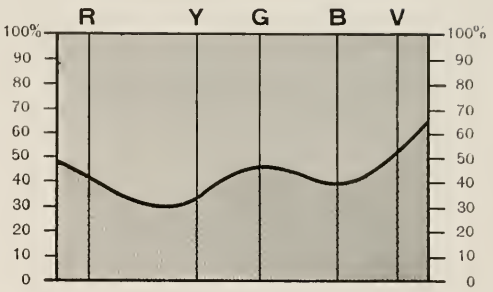


AMETHYST B

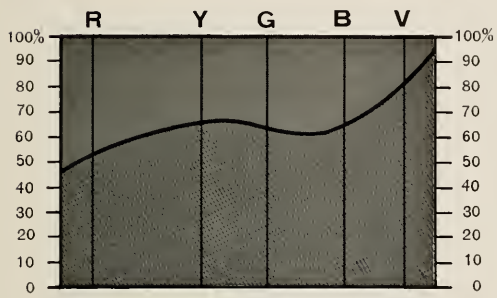
COLOR AND ABSORPTION CHART—III



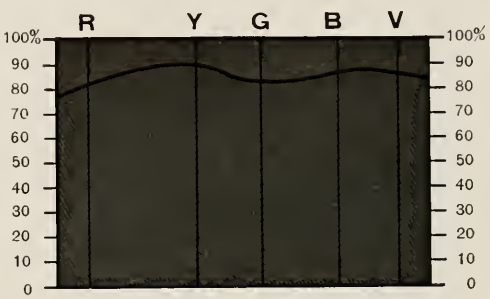
SMOKE A



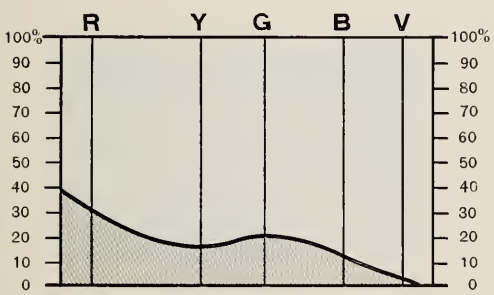
SMOKE B



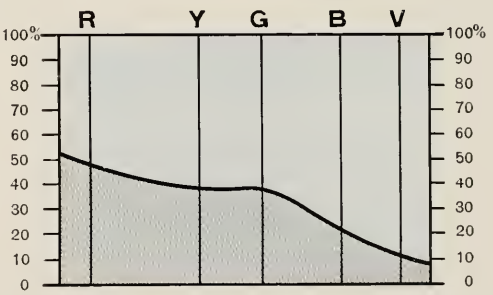
SMOKE C



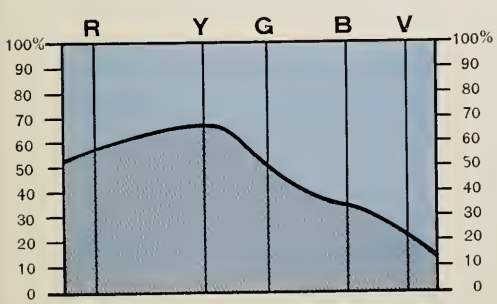
SMOKE D



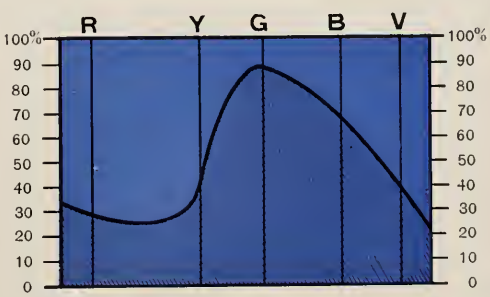
BLUE A



BLUE B



BLUE C



BLUE D

The colors and shades adopted for ophthalmic lenses have been confined to a range of sufficient latitude to answer a great variety of purposes. It will be an easy task, therefore, by reference to the chart, to select the one meeting the necessary requirements.

Crookes glass is of a neutral color and is supplied in two shades; the light shade is so colorless as to appear almost like white glass, while the darker tint absorbs the same amount of ultra-violet and heat rays as the light tint. This glass owes its origin to Sir William Crookes, who conducted the experiments for a glass to overcome the heat and ultra-violet rays.

Euphos glass is the result of scientific investigations conducted by Dr. Schanz, of Dresden. It is of a greenish tint in two shades and designed for use wherever it is desirable to eliminate the ultra-violet rays entirely, especially for work under powerful arc lamps and any other high-power illuminants.

Noviol is a new glass of a very brilliant yellow tint in three shades. It affords the eye absolute protection against the ultra-violet, violet and blue rays and at the same time absorbs a large percentage of the infra red rays. It does not show an appreciable absorption of the rest of the spectrum and on that account permits a clear vision both of near and distant objects.

Fieuzal glass is the result of research work on the part of Dr. Fieuzal, of Paris. The glass has a greenish yellow tint and, as the respective curve in the color chart will show, will serve an admirable purpose, in the lighter shade, for comfort in motoring, boating, etc., without changing the natural appearance of landscapes, and in the darker shade, where it is desired to check the ultra-violet rays.

Amber glass has come into popular favor in recent years. It has limited absorptive properties but is very useful in motoring and where it is designed to tone down the color of light for numerous other outdoor occupations. It is made in two shades.

Amethyst has a limited demand but is preferred by some optometrists and opticians, and we supply it in the two shades given in our color chart.

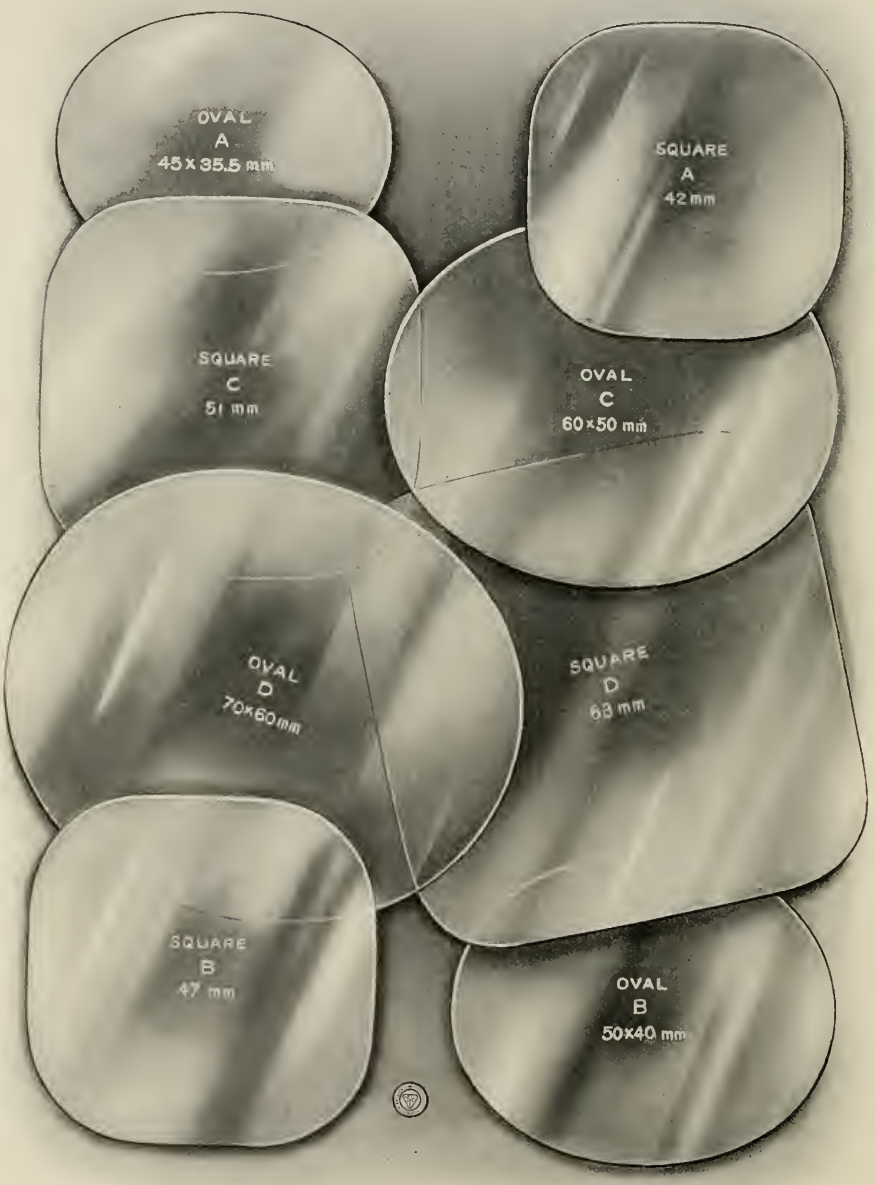
Smoke, a neutral tint of four shades, has been found by experiment to accomplish the result of moderating the light satisfactorily and it is recommended, therefore, for general use.

Blue glass is still preferred by many and is also offered in four shades. It serves many purposes, particularly for use at the sea shore.

The following pages will illustrate the standard sizes in which the various kinds of colored glass are regularly supplied. To insure correct focal results, wherever our tools are employed, only the glass herein mentioned should be used. An allowance for matching shades will have to be made, as glass manufacturers find it impossible to duplicate colored glass exactly in shade.

SIZES OF FLAT OPTICAL GLASS BLANKS

OVAL AND SQUARE



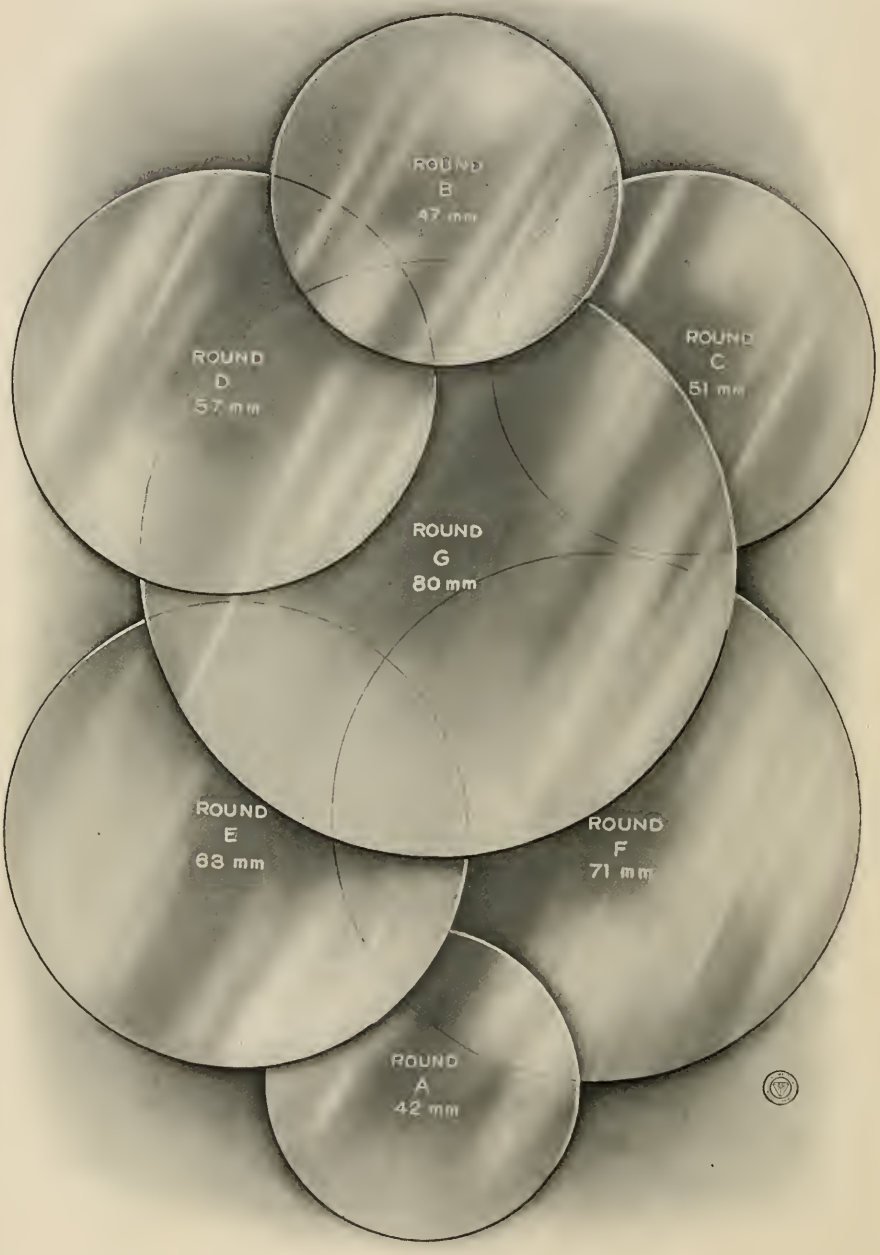
PRICES FOR FLAT OPTICAL GLASS BLANKS

OVAL AND SQUARE

Per Dozen Pairs	OVAL A 45 x 35.5 mm	OVAL B 50 x 40 mm	OVAL C 60 x 50 mm	OVAL D 70 x 60 mm	SQUARE A 42 mm	SQUARE B 47 mm	SQUARE C 51 mm	SQUARE D 63 mm
White								
Crown								
2 to 2.5 mm thick	$0.50	$0.75	$1.00	$1.50	$0.50	$0.75	$1.00	$2.50
3 to 4 mm thick	0.75	1.00	1.50	2.00	0.75	1.00	1.50	3.00
5 to 7 mm thick	1.00	1.50	2.00	3.00	1.00	1.50	2.00	4.00
Roentgen								
2 to 2.5 mm thick	2.25	2.50	5.00	....	2.50	3.00		
3 to 4 mm thick	2.50	3.00	6.00	....	3.00	4.00		
Colored								
Smoke								
2 to 2.5 mm thick	0.75	1.00	1.50	2.00	0.75	1.00	1.50	3.50
3 to 4 mm thick	1.00	1.50	2.00	3.00	1.00	1.50	2.00	4.25
5 to 7 mm thick	1.50	2.00	3.00	4.25	1.50	2.00	3.00	5.75
Blue								
2 to 2.5 mm thick	0.75	1.00	1.50	2.00	0.75	1.00	1.50	3.50
3 to 4 mm thick	1.00	1.50	2.00	3.00	1.00	1.50	2.00	4.25
5 to 7 mm thick	1.50	2.00	3.00	4.25	1.50	2.00	3.00	5.75
Amber								
2 to 2.5 mm thick	0.90	1.30	1.75	2.50	0.90	1.30	1.75	4.50
3 to 4 mm thick	1.30	1.75	2.50	3.50	1.30	1.75	2.50	5.25
5 to 7 mm thick	1.75	2.50	3.50	5.25	1.75	2.50	3.50	7.00
Amethyst								
2 to 2.5 mm thick	1.00	1.50	2.00	3.00	1.00	1.50	2.00	5.00
3 to 4 mm thick	1.50	2.00	3.00	4.00	1.50	2.00	3.00	6.00
5 to 7 mm thick	2.00	3.00	4.00	6.00	2.00	3.00	4.00	8.00
Fieuzal								
2 to 2.5 mm thick	1.00	1.50	2.00	3.00	1.00	1.50	2.00	5.00
3 to 4 mm thick	1.50	2.00	3.00	4.00	1.50	2.00	3.00	6.00
5 to 7 mm thick	2.00	3.00	4.00	6.00	2.00	3.00	4.00	8.00
Per Pair	**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**
Euphos								
2 to 2.5 mm thick	....	....	....	....	....	$0.50		
3 to 4 mm thick	....	....	....	....	....	0.60		
5 to 7 mm thick	....	....	....	....	....	0.75		
Noviol								
2 to 6 mm thick	....	....	....	....	....	1.50		

SIZES OF FLAT OPTICAL GLASS BLANKS

ROUND



PRICES FOR FLAT OPTICAL GLASS BLANKS

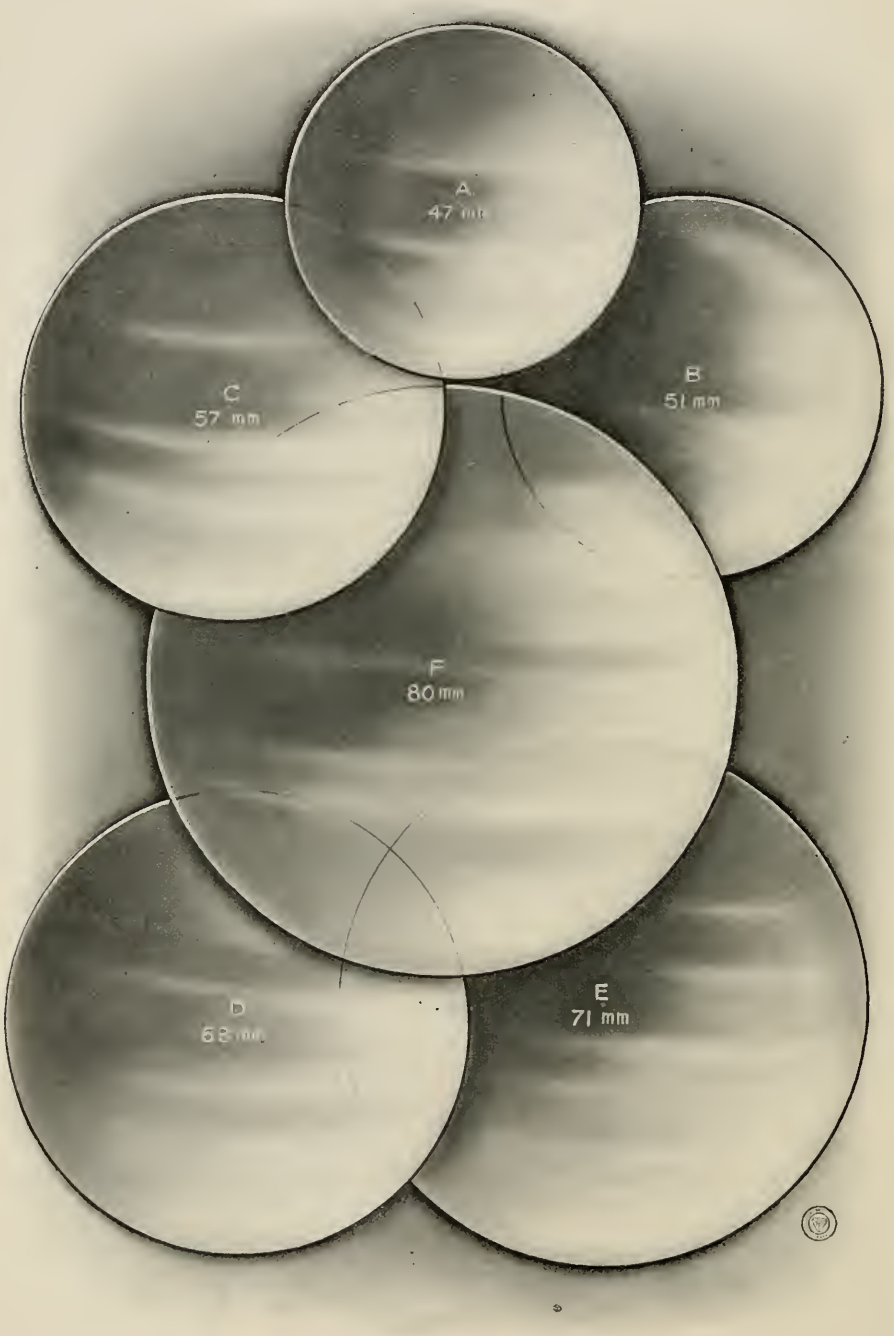
ROUND

Per Dozen Pairs	A 42 mm	B 47 mm	C 51 mm	D 57 mm	E 63 mm	F 71 mm	G 80 mm
White							
Crown							
2 to 2.5 mm thick	$0.50	$0.75	$1.00	$1.75	$2.50	$3.25	$4.00
3 to 4 mm thick	0.75	1.00	1.50	2.25	3.00	4.00	5.00
5 to 7 mm thick	1.00	1.50	2.00	3.00	4.00	5.00	6.00
Roentgen							
2 to 2.5 mm thick	....	2.50					
3 to 4 mm thick	....	3.00					
Colored							
Smoke							
2 to 2.5 mm thick	0.75	1.00	1.50	2.50	3.50	4.50	5.50
3 to 4 mm thick	1.00	1.50	2.00	3.25	4.25	5.50	7.00
5 to 7 mm thick	1.50	2.00	3.00	4.25	5.50	7.00	8.50
Blue							
2 to 2.5 mm thick	0.75	1.00	1.50	2.50	3.50	4.50	5.50
3 to 4 mm thick	1.00	1.50	2.00	3.25	4.25	5.50	7.00
5 to 7 mm thick	1.50	2.00	3.00	4.25	5.50	7.00	8.50
Amber							
2 to 2.5 mm thick	0.90	1.30	1.75	3.00	4.50	5.75	7.00
3 to 4 mm thick	1.30	1.75	2.50	4.00	5.25	7.00	8.75
5 to 7 mm thick	1.75	2.50	3.50	5.25	7.00	8.75	10.50
Amethyst							
2 to 2.5 mm thick	1.00	1.50	2.00	3.50	5.00	6.50	8.00
3 to 4 mm thick	1.50	2.00	3.00	4.50	6.00	8.00	10.00
5 to 7 mm thick	2.00	3.00	4.00	6.00	8.00	10.00	12.00
Fieuzal							
2 to 2.5 mm thick	1.00	1.50	2.00	3.50	5.00	6.50	8.00
3 to 4 mm thick	1.50	2.00	3.00	4.50	6.00	8.00	10.00
5 to 7 mm thick	2.00	3.00	4.00	6.00	8.00	10.00	12.00

Per Pair	A	B	C	D	E	F	G
Euphos							
2 to 2.5 mm thick	....	$0.40					
3 to 4 mm thick	....	0.45					
5 to 7 mm thick	....	0.50					
Crookes							
2 to 2.5 mm thick	....	0.45					
3 to 4 mm thick	....	0.60					
5 to 7 mm thick	....	1.00					
Noviol							
2 to 6 mm thick	....	1.20					

SIZES OF MOULDED OPTICAL GLASS BLANKS

ROUND



PRICES FOR MOULDED OPTICAL GLASS BLANKS

ROUND, 6.00 AND 9.00 CURVE

Per Dozen Pairs	A 47 mm	B 51 mm	C 57 mm	D 63 mm	E 71 mm	F 80 mm
White						
6.00 Curve						
Crown						
2 to 2.5 mm thick	$1.25	$1.50	$2.00	$2.75	$3.75	$5.00
3 to 4 mm thick	1.50	2.00	2.50	3.25	4.50	6.00
5 to 7 mm thick	2.00	2.50	3.00	4.25	5.50	7.00
Roentgen						
2 to 2.5 mm thick	4.00					
3 to 4 mm thick	5.00					
9.00 Curve						
Crown						
2 to 2.5 mm thick	2.00	2.50	3.00			
3 to 4 mm thick	2.25	3.00	4.00			
5 to 7 mm thick	2.75	3.75	5.00			
Colored						
6.00 Curve						
Smoke						
2 to 2.5 mm thick	1.75	2.00	2.75	4.00	5.25	7.00
3 to 4 mm thick	2.00	2.75	3.50	4.75	6.25	8.50
5 to 7 mm thick	2.75	3.50	4.25	6.00	7.75	9.75
Blue						
2 to 2.5 mm thick	1.75	2.00	2.75	4.00	5.25	7.00
3 to 4 mm thick	2.00	2.75	3.50	4.75	6.25	8.50
5 to 7 mm thick	2.75	3.50	4.25	6.00	7.75	9.75
Amber						
2 to 2.5 mm thick	2.25	2.50	3.50	4.75	6.50	8.75
3 to 4 mm thick	2.50	3.50	4.50	5.75	8.00	10.50
5 to 7 mm thick	3.50	4.50	5.25	7.50	9.75	12.25
Amethyst						
2 to 2.5 mm thick	2.50	3.00	4.00	5.50	7.50	10.00
3 to 4 mm thick	3.00	4.00	5.00	6.50	9.00	12.00
5 to 7 mm thick	4.00	5.00	6.00	8.50	11.00	14.00
Fieuzal						
2 to 2.5 mm thick	2.50	3.00	4.00	5.50	7.50	10.00
3 to 4 mm thick	3.00	4.00	5.00	6.50	9.00	12.00
5 to 7 mm thick	4.00	5.00	6.00	8.50	11.00	14.00
Per Pair	**A**	**B**	**C**	**D**	**E**	**F**
Euphos						
6.00 Curve						
2 to 2.5 mm thick	$0.50					
3 to 4 mm thick	0.60					
5 to 7 mm thick	0.75					
Crookes						
6.00 Curve						
2 to 2.5 mm thick	0.60					
3 to 4 mm thick	0.75					
5 to 7 mm thick	1.15					
Noviol						
6.00 Curve						
2 to 6 mm thick	1.20					

REPRODUCTION OF OPHTHALMIC LENS CHART

DIAGRAMS SHOWING USEFUL FIELD OF VIEW

of different Types of + 8 D Ophthalmic Lenses

The full diagram represents such instances the combination of a positive spherical lens with a non-astigmatic hyperfocal eye. The performance of negative lenses in combination with myopic eyes is strictly analogous. When the lens of sight is directed through the centre of the lens the retina receives an image precisely similar to the object. When the eye swings about its centre of rotation, so that the line of sight forms an angle with the axis of the lens, the image received by the retina suffers from its defects astigmatism and distortion. By reason of the astigmatism due to the oblique passage of the pencils of light through the lens, horizontal and vertical lines are not simultaneously sharp. By reason of distortion, straight lines of the object appear curved. The magnitude of both defects increases with the angle between the line of sight and the axis of the lens and for the same angle varies between wide limits for different types of lenses.

The black dotted curved lines f and f_1 of the diagrams represent the location of the astigmatic foci of the lenses. The distance between the curves measured along the ray passing through C the centre of rotation of the eye, represents the lens astigmatism in that direction.

Angles of view are presented in black figures, the astigmatism in these directions, expressed in dioptres, follows in red figures e. g. $\frac{8}{0}$ 2.50 D.

The angle at which the astigmatism equals 0.12 D is taken, for the purpose of comparison, as the limit of useful field. The angular value of the useful field of view for each case is indicated as bevel type at the left of the lenses.

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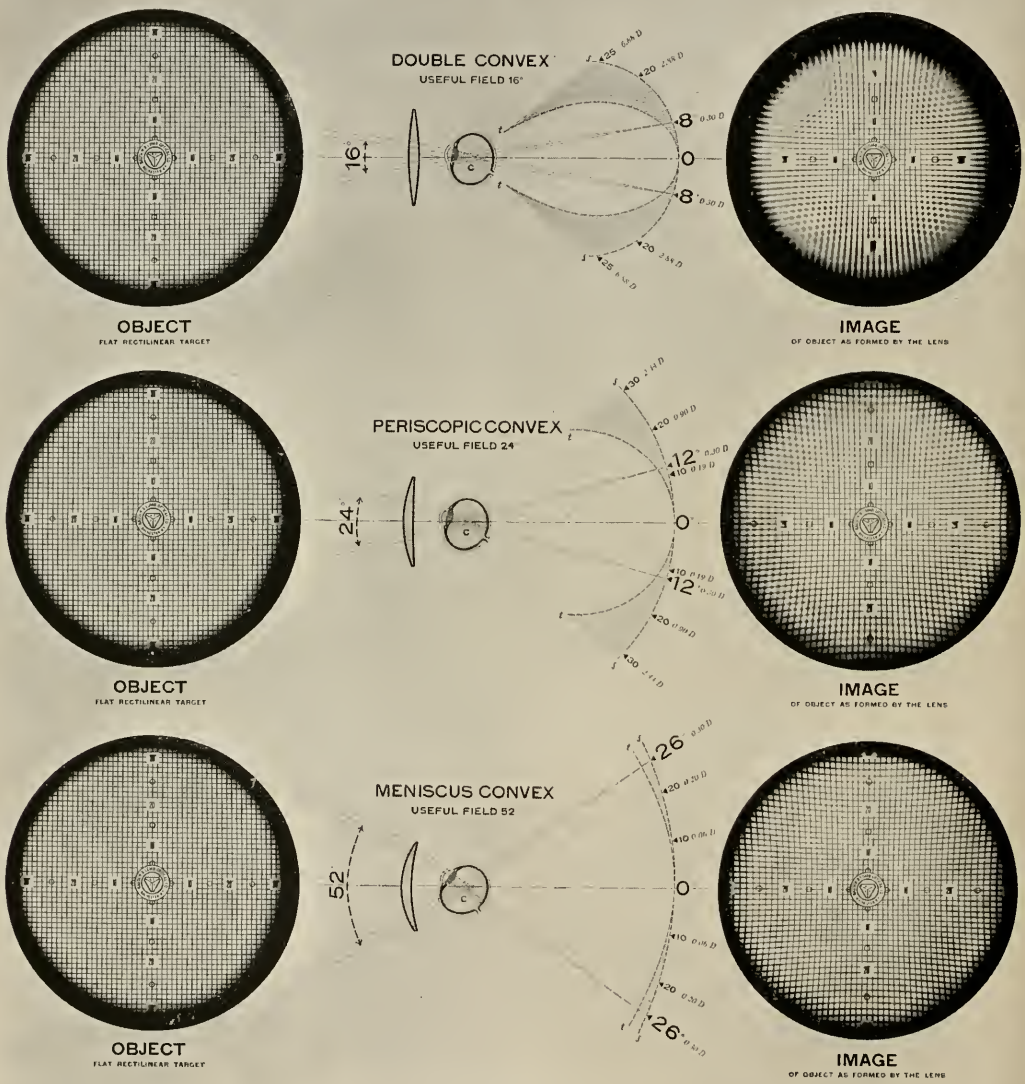

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BAUSCH & LOMB OPTICAL CO.

ROCHESTER, N. Y.

DESCRIPTION OF OPHTHALMIC LENS CHART

THE old idea that the eye is a camera behind the correcting lens is not regarded as covering the possibilities of use which the eye may make of the lens in front of it.

In practice the eye-ball rotates in the orbit. In reading, for example, the head is stationary and the eye directed to various parts of the field by rotating it like a ball in a socket; and since the frame of the glasses is in a fixed relation to the head, the eyes will use different portions of the lens. It is thus apparent that the correction of the refraction of an eye, when directed straight forward, is only a small part of the functions of a perfect eye lens.

The point about which the eye-ball rotates, the center of rotation, is called C in the following diagram. It is located about 13 mm back of the cornea and consequently about 27 mm back of the eye lens.

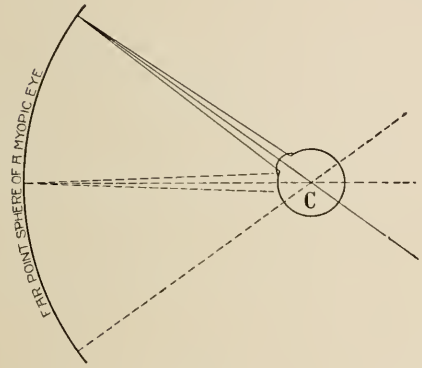


FIG. 1

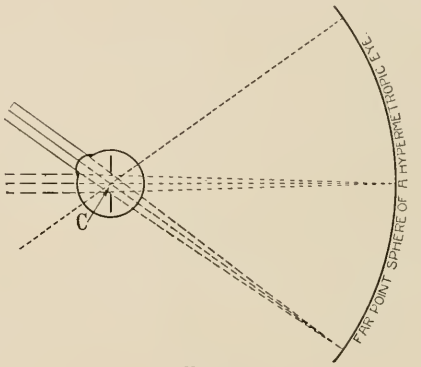


FIG. 2

With the eye, of course, rotate the near point and the far point, and they will always lie on spheres with C as center. The figures show these spheres for a myopic and a hyperopic eye. The axis of all the pencils of light coming from various objects, upon which the eye may be fixed, go through C. The width of these pencils is determined by the diameter of the pupil, and it is apparent from the figures that the pupil in its various positions can be replaced by one imaginary diaphragm of about the width of the pupil and located in C.

The ideal lens should image any far object within the reach of the eye on the far point sphere, so that no matter in what direction the eye looks it will always see objects undistorted and with the same sharpness of definition as in the case of objects near the center of the field.

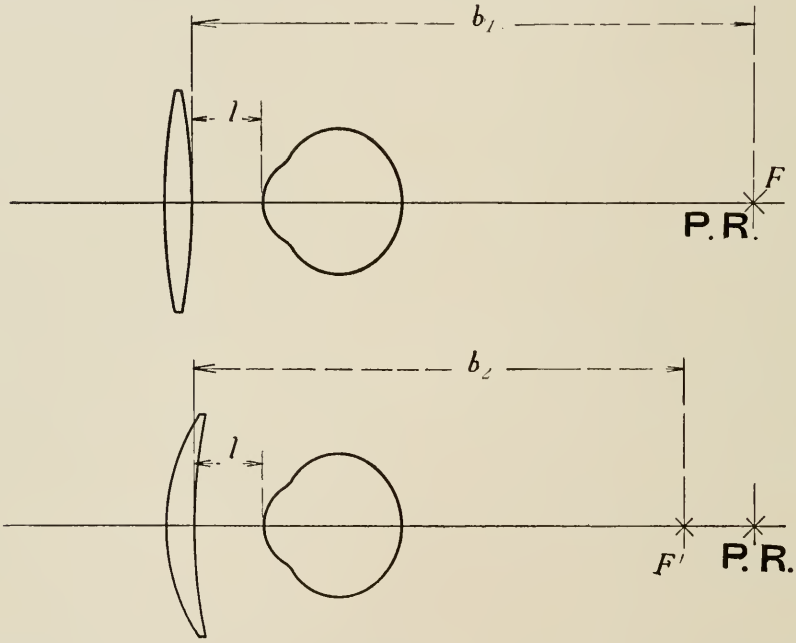
The chart on page 34 shows how much the performance of a double convex, periscopic and a meniscus convex lens differ from the ideal lens. The diagrams prove strikingly that the meniscus lens offers the greatest area of field.

For a complete treatise upon this chart, attention is called to our pamphlet "The Eye and the Lens," No. 1 of our "Scientific and Technical Publications." (See page 147.)

A FEW FACTS ABOUT VERTEX REFRACTION

A DEFECTIVE eye is corrected for distant vision by that lens which forms an image of a distant object in the Punctum Remotum of the eye.

The general practice of optometry has so far not proceeded according to this principle but has indiscriminately used lenses of any form for correction of any eye, as long as they were of the same power. This is wrong, since lenses of the same power, but of different shape, have not the same back focus, consequently do not form the image of a far distant object at the same distance from the rear surface, and are therefore not interchangeable. The diagrams below show a double convex and a meniscus convex lens in front of the eye, both of the same power but the meniscus lens over-correcting —stronger than the flat since in the meniscus lens the back focus, "b," is shorter than the back focus of the flat lens.



Therefore, the present way of designating the power of lenses by reciprocals of focal length is not correct, because it measures something which is really of no value to the proper performance of the lens.

The power of a lens, up to the present time, has been measured by comparing it with that of a lens of the same power but opposite sign, i. e.—by neutralization.

This method again is incorrect, since it can be shown that two lenses of

the same power but of different shape cannot be neutralized by one lens of the opposite sign. The present manner of designating the power of the lenses, as well as the method of measuring this power, are, therefore, not defendable.

A new and very simple method has been suggested by Dr. M. von Rohr in his book, "Das Auge und die Brille." He proposes to use the reciprocal of the distance from focal point to lens surface (the back focus) as measure for the effective power of the lens and calls the power thus defined "Brillenscheitel Refraction"—in English, "Vertex Refraction." We have adopted this system for all Punktal and Katral series and use for it the symbol D_V.

To enable the transforming of the present system (D), which we are still using in all flat, periscopic and meniscus lenses, into vertex diopters (D_V), we are showing a compensation table on the following page.

The table gives the powers in vertex diopters for the flat, periscopic and meniscus lenses. The vertical column at the extreme left is a reference scale of focus numbers in ordinary diopters. Under the name of each type of lens are two columns; the figures in the first of these are the powers, expressed in vertex diopters (D_V), of lenses whose powers, according to the present system of numbering, are given by the figures appearing in the reference scale at the left. The figures in the second column, under the heading "Substitute," give the power of lenses (present system of numbering) which should be used to provide, as nearly as possible, vertex refraction corresponding to the figures in the reference scale. These results will be approximate, but until lenses are made to conform exactly to the vertex diopter system (D_V), the table of correction is made to under-correct rather than over-correct the difference.

For instance, if a 5.00 D double convex lens is found to correct an eye and it is desired to use a meniscus lens, find first the figure 5.00 in the scale at the left. In the same horizontal line in the second column under meniscus convex, we find 4.75 D. This is the number of the meniscus lens which will give correction nearest to that of the 5.00 D double convex.

A complete treatise on this subject of Vertex Refraction will be found in our pamphlet, "The Substitution of Meniscus for Flat Ophthalmic Lenses and a New System of Designating their Powers," No. 2 of our "Scientific and Technical Publications." (See page 147.)

COMPENSATION TABLE

CONVERTING ORDINARY DIOPTERS (D) INTO VERTEX DIOPTERS (D_V)

D	DOUBLE				PERISCOPIC				MENISCUS			
	Convex		Concave		Convex		Concave		Convex		Concave	
	D_V	Substitute	D_V	Substitute	D_V	Substitute	D_V	Substitute	D_V	Substitute	D_V	Substitute
0.12	**0.12**	**0.12**	**0.12**	**0.12**	**0.13**	**0.12**	**0.12**	**0.12**	**0.13**	**0.12**	**0.13**	**0.12**
0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.25
0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.38	0.37
0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.50
0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.62	0.63	0.62
0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.76	0.75	0.76	0.75
0.87	0.86	0.87	0.86	0.87	0.86	0.87	0.86	0.87	0.88	0.87	0.88	0.87
1.00	**0.99**	**1.00**	**0.99**	**1.00**	**0.99**	**1.00**	**0.99**	**1.00**	**1.02**	**1.00**	**1.02**	**1.00**
1.12	1.11	1.12	1.11	1.12	1.11	1.12	1.11	1.12	1.14	1.12	1.14	1.12
1.25	1.23	1.25	1.23	1.25	1.24	1.25	1.23	1.25	1.27	1.25	1.28	1.25
1.37	1.35	1.37	1.35	1.37	1.36	1.37	1.35	1.37	1.39	1.37	1.40	1.37
1.50	1.48	1.50	1.48	1.50	1.49	1.50	1.48	1.50	1.52	1.50	1.54	1.50
1.62	1.60	1.62	1.60	1.62	1.61	1.62	1.60	1.62	1.65	1.62	1.67	1.62
1.75	1.73	1.75	1.73	1.75	1.74	1.75	1.73	1.75	1.78	1.75	1.80	1.75
2.00	**1.98**	**2.00**	**1.98**	**2.00**	**1.99**	**2.00**	**1.97**	**2.00**	**2.04**	**2.00**	**2.06**	**2.00**
2.25	2.22	2.25	2.22	2.25	2.24	2.25	2.22	2.25	2.29	2.25	2.29	2.25
2.50	2.47	2.50	2.47	2.50	2.49	2.50	2.47	2.50	2.55	2.50	2.55	2.50
2.75	2.72	2.75	2.72	2.75	2.74	2.75	2.71	2.75	2.82	2.75	2.80	2.75
3.00	**2.96**	**3.00**	**2.95**	**3.00**	**2.99**	**3.00**	**2.96**	**3.00**	**3.09**	**3.00**	**3.06**	**3.00**
3.25	3.21	3.25	3.20	3.25	3.24	3.25	3.20	3.25	3.34	3.25	3.31	3.25
3.50	3.46	3.50	3.45	3.50	3.49	3.50	3.45	3.50	3.60	3.50	3.57	3.50
3.75	3.71	3.75	3.70	3.75	3.74	3.75	3.70	3.75	3.85	3.50	3.82	3.75
4.00	**3.95**	**4.00**	**3.95**	**4.00**	**4.00**	**4.00**	**3.95**	**4.00**	**4.13**	**3.75**	**4.07**	**4.00**
4.25	4.20	4.25	4.20	4.25	4.25	4.25	4.20	4.25	4.39	4.00	4.33	4.00
4.50	4.45	4.50	4.44	4.50	4.50	4.50	4.44	4.50	4.65	4.25	4.58	4.25
4.75	4.70	4.75	4.68	4.75	4.75	4.75	4.69	4.75	4.92	4.50	4.84	4.50
5.00	**4.95**	**5.00**	**4.93**	**5.00**	**5.00**	**5.00**	**4.93**	**5.01**	**5.19**	**4.75**	**5.09**	**4.75**
5.25	5.19	5.25	5.18	5.25	5.27	5.25	5.18	5.25	5.45	5.00	5.35	5.00
5.50	5.44	5.50	5.43	5.50	5.52	5.50	5.43	5.50	5.71	5.25	5.61	5.25
5.75	5.69	5.75	5.67	5.75	5.78	5.75	5.67	5.75	5.99	5.50	5.86	5.50
6.00	**5.94**	**6.00**	**5.92**	**6.00**	**6.04**	**6.00**	**5.92**	**6.00**	**6.28**	**5.75**	**6.11**	**5.75**
6.50	6.44	6.50	6.41	6.50	6.55	6.50	6.41	6.50	6.81	6.00	6.63	6.50
7.00	**6.94**	**7.00**	**6.90**	**7.00**	**7.09**	**7.00**	**6.91**	**7.00**	**7.38**	**6.50**	**7.14**	**7.00**
7.50	7.44	7.50	7.40	7.50	7.60	7.50	7.40	7.50	7.93	7.00	7.65	7.50
8.00	**7.94**	**8.00**	**7.89**	**8.00**	**8.14**	**8.00**	**7.89**	**8.00**	**8.52**	**7.50**	**8.16**	**8.00**
8.50	8.44	8.50	8.38	8.50	8.65	8.50	8.38	8.50				
9.00	**8.94**	**9.00**	**8.87**	**9.00**	**9.18**	**9.00**	**8.88**	**9.00**				
9.50	9.44	9.50	9.37	9.50	9.72	9.00	9.37	9.50				
10.00	**9.94**	**10.00**	**9.86**	**10.00**	**10.29**	**9.50**	**9.87**	**10.00**				
10.50	10.46	10.50	10.35	10.50	10.81	10.00	10.36	10.50				
11.00	**10.96**	**11.00**	**10.84**	**11.00**	**11.35**	**11.00**	**10.84**	**11.00**				
12.00	**11.97**	**12.00**	**11.83**	**12.00**	**12.47**	**12.00**	**11.84**	**12.00**				
13.00	**12.99**	**13.00**	**12.82**	**13.00**	**13.61**	**12.00**	**12.83**	**13.00**				
14.00	**14.01**	**14.00**	**13.80**	**14.00**	**14.76**	**13.00**	**13.79**	**14.00**				
15.00	**15.04**	**15.00**	**14.77**	**15.00**	**15.99**	**14.00**	**14.81**	**15.00**				
16.00	**16.09**	**16.00**	**15.77**	**16.00**	**17.25**	**15.00**	**15.80**	**16.00**				
18.00	**18.18**	**18.00**	**17.72**	**18.00**	**19.93**	**16.00**	**17.78**	**18.00**				
20.00	**20.34**	**20.00**	**19.69**	**20.00**	**22.86**	**18.00**	**19.74**	**20.00**				

OPHTHALMIC LENSES

With a definite knowledge of the refractive and dispersive properties of glass, our Scientific Bureau computes the formulæ, i. e., the radii for both sides of the lens and the center thickness to which all focused lenses are to be ground. These formulæ having been accepted and tools and gauges made to conform thereto, it becomes the work of the operatives to maintain carefully, by constant gauging, the correct curvature of the tools. A set of master gauges is approved by the Bureau, and all tools and gauges used in the various stages of manufacture are kept true to curves by comparison with this set.

In the manufacture of ophthalmic lenses science and skill have enabled us to achieve results which have made the slogan, Bausch & Lomb Quality, synonymous with the best in lens manufacture. Our lenses are sold in every country in the world and are universally recognized as representing the highest achievement of the optician's art.

For more than sixty years, Bausch & Lomb Quality has been the quality above all others to which lens manufacturers have aspired, and while our early efforts were crude compared to our present day standards, we have always allied ourselves closely with the advancement of the industry. Every detail is constantly under our direct supervision, and every known device is utilized to maintain the greatest possible accuracy.

We began the production of lenses with the plano and double convex and concave forms, to which were added the periscopic and later the deeper curved and other types. Our records show that we began the production of ophthalmic lenses for the general market in 1878, but much earlier for our own consumption. From a few types of lenses were developed a complete line adequate to meet any demand of the oculist, optometrist and optician.

All our computations are based on the metric system of measurement, the unit of which is the diopter. The power of a lens is expressed by the reciprocal of the focal length, or 1 divided by the focal length. The longer the focal length, the weaker the power; the shorter, the stronger. Power is designated by reference to the unit, the diopter. A lens of one meter focus has a power of 1/1 D; of 2 meters, 1/2 D; of 1/4 meter, 4 D, etc.

To accommodate the demand for different thicknesses our uncut lenses (note exceptions) are made in Standard and Rimless. The maximum deviation from these established thicknesses, which is permitted in manufacture, is from 0.2 to 0.4 mm, according as the focus of the lens is strong or weak. Some of the lower priced lenses are oval, large enough to cut the usual run of small eye sizes. We recommend, however, the 47 mm size, which will permit

cutting not only all standard sizes, but also cutting to the optical center of the lens all sizes up to, and including, 000½ eye. This will be found particularly useful for cylinder combinations.

With the introduction of the Punktal and Katral lenses, to which more complete reference is made in subsequent pages of this catalog, it is found necessary to designate our various types of ophthalmic lenses by series on account of their varying properties. To distinguish them we have applied trade names as follows:

Centex—Represents our standard of production which has given Bausch & Lomb Lenses the reputation they now enjoy. This series will continue to be, for some time at least, the lens for general use. In optical correction they are equal to the Primex, but surface quality is measured by our standard method, and thickness is limited to the variations given on page 45. They are, like the Primex series, based on the present system of refraction; that is to say, the convex and concave powers neutralize each other and conform to the double convex and concave lenses of the trial case now generally in use. The negative powers are computed to their exact diopter values, while the positive powers are made sufficiently weaker to compensate for the difference in center thickness. Reference should be made to the table of stock foci on page 43, which also shows the difference in powers as measured for vertex refraction (D_V).

Primex—Represents a lens of the best surface quality, free from strain and of accurate centration. Each lens is carefully tested for these important factors; optical center is indicated, and thickness for all foci selected to accommodate $1\frac{3}{4}$ mm strap for 00 eye size. Lenses of this series are made 47 mm round, in toric form only, (6.00 Base Curve). They are based on the (D) method of refraction and designed to meet the demand for a high-grade lens, differing from the Punktal series in the fact that the marginal zones are not so well corrected.

Punktal—Corresponding to the anastigmat lens in the photographic field, the Punktal lens represents the acme of ophthalmic lens production. No base curve is employed, the curves required to correct each power being computed separately, thus giving *astigmatic correction in all powers* to the margin of the lens. Every surface is carefully tested for wavy irregularities and strain. Center is indicated with but a small minimum of allowance, and thickness is controlled, for 000 eye, to fit a $1\frac{3}{4}$ strap. These lenses are based on the vertex system of refraction (D_V), made in toric form and in foci up to, and including, 7.00 D_V in plus and 20.00 D_V in minus powers.

The positive and negative powers of this series are computed to their exact diopter powers, i. e., they do not neutralize each other, and in connection therewith the trial case lenses made by us and illustrated in our catalog of

Ophthalmic Apparatus should preferably be used. The ordinary test lenses of double convex and concave form, however, if carefully computed, will serve the purpose with small and allowable differences (see Pamphlet No. 5, "Scientific and Technical Publications"). A small reproduction of our trade mark, (B&L), is lightly engraved on the surface of each lens, near the margin. A more detailed description of these lenses is found on pages 75 to 77.

Katral—Have the same optical qualities as the Punktal but are intended for the correction of cataract cases. They are made in all foci stronger than 7.00 D_V plus and to order only. Each individual case requires special formulæ, for which detailed information is given in subsequent pages of this catalog. (See page 80.)

Umbral—Represents a new line of colored focused lenses in which the absorption is uniform over the entire surface of the lens. They are designed for high grade optical work and made exclusively in toric form. These lenses are supplied in the Punktal and Primex series only. As previously stated, it is not always possible to match shades exactly, and we allow ourselves some variation of shade either way.

In ordering our lenses it is essential to specify "Bausch & Lomb" in addition to the designation representing the series desired.

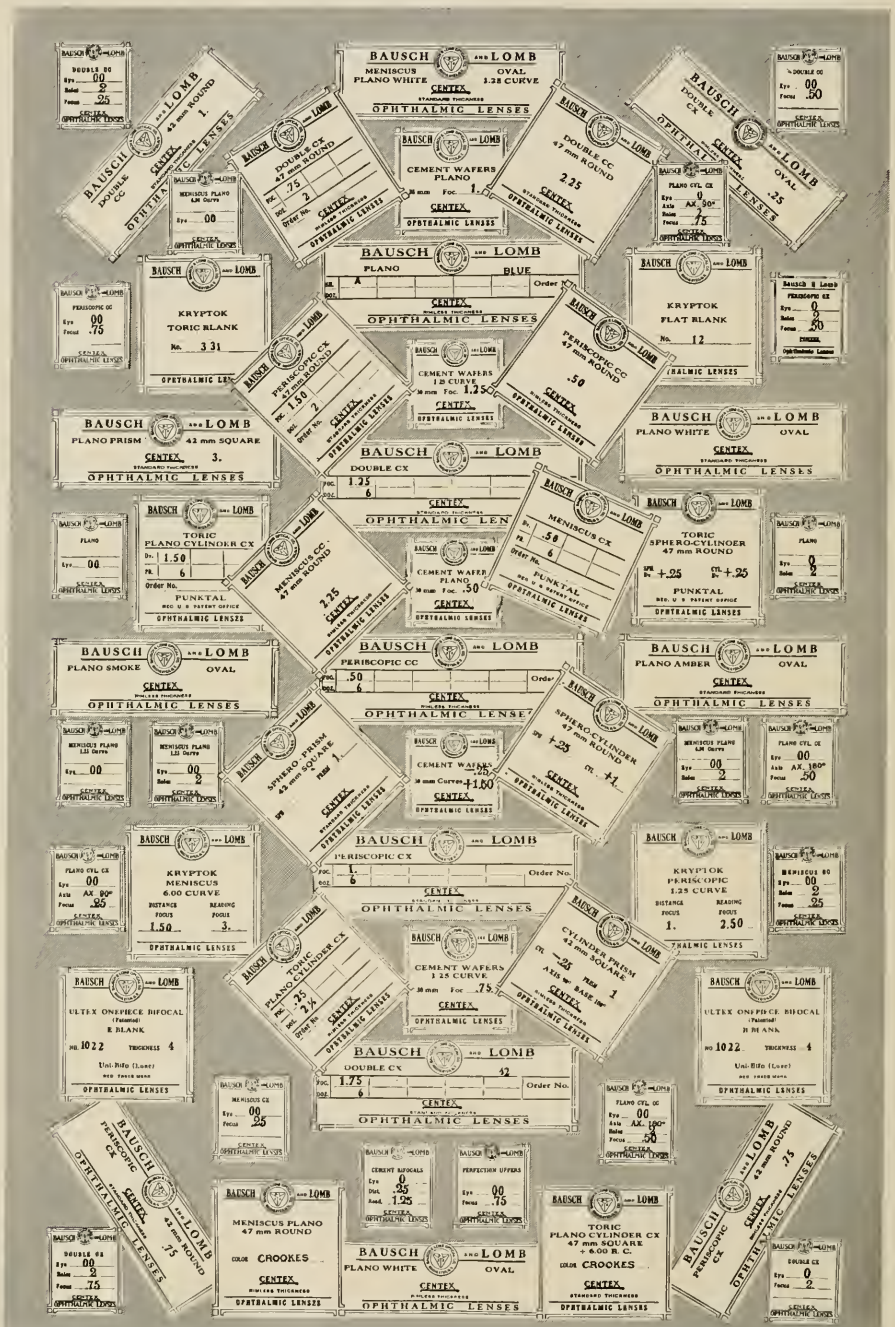
On a subsequent page we give illustrations of our lens labels, from which the labeling of our various grades may be recognized. All Uncut Lenses are packed in envelopes either singly or in pairs, except Plano, Sphero, oval, Flat Rough Cylinders, Colored, Plano and Rough Prisms, Coquille and Mi-Coquille, oval. These are packed in paper wrappers.

As our lenses are distributed through the wholesale trade, they are put up—in their individual envelopes or wrappers—in packages of so-called minimum quantities, and in these packages sold at the regular dozen prices. When ordered in less than minimum quantities, necessitating the breaking of packages, an extra charge is made to cover the cost of repacking. (See table of minimum quantities, pages 46 and 47.)

For the convenience of the trade, our lens containers and envelopes of Centex, Primex, Punktal and Katral series are marked with the foci according to the system of measurement applying to each series. As the vertex refraction method seems certain to become the standard of the future, the table on page 38 will assist materially in determining the relative differences.

We offer a lens of Portex quality in the Plano, oval and round, Periscopic, Convex, oval, Double Convex, oval and round, and Meniscus Plano. Portex designates second choice of selection.

FACSIMILE DISPLAY OF B. & L. LENS LABELS



PRIMEX AND CENTEX FOCI AND CODE

These lenses conform to the old (D) method of refraction, the vertex refraction (D_V) being given for comparison only.

This table specifies the foci regularly carried in stock and will serve as a guide in ordering.

The following foci are furnished without extra charge, but only in white Spherical and Flat Plano-Cylinders 0.68, 1.87, 2.12, 2.37, 2.62, 2.87, 6.25, 6.75.

Code for Spherical (double), Cylinder and Prism, is for white lenses finished on both sides, of standard thickness.

Add the words Rough, Plano, Periscopic, Meniscus, Smoke, Blue, Amber, Amethyst, Fienzal, Crookes, Noviol, Euphos or Rimless when such lenses are ordered.

Use Sphero and Cylinder code words together for Sphero-Cylinder combinations.

Code for Toric is for one surface, the other surface to be designated Rough or Plano as desired. If Sphero, use code word for Sphero focus wanted.

D	SPHERO + D_V	SPHERO + Code	SPHERO − D_V	SPHERO − Code	CYLINDER + D_V	CYLINDER + Code	CYLINDER − D_V	CYLINDER − Code
0.12	0.12	Skell	0.12	Search	0.12	Commerce	0.12	Cricket
0.25	0.25	Skiff	0.25	Seam	0.25	Commode	0.25	Crisis
0.37	0.37	Skull	0.37	Script	0.37	Common	0.37	Critic
0.50	0.50	Sketch	0.50	Screw	0.50	Compass	0.49	Cross
0.62	0.62	Skout	0.62	Screen	0.62	Complex	0.62	Crown
0.75	0.75	Skate	0.75	Scrap	0.74	Concern	0.74	Crumb
0.87	0.86	Size	0.86	Scotch	0.86	Cone	0.86	Crystal
1.00	0.99	Sky	0.99	Scoop	0.99	Congress	0.99	Culprit
1.12	1.11	Strip	1.11	Solar	1.11	Cause	1.11	Coast
1.25	1.23	Six	1.23	Science	1.24	Concord	1.23	Current
1.37	1.35	Stud	1.35	Song	1.36	Cash	1.35	Cloud
1.50	1.48	Sink	1.48	School	1.48	Consul	1.48	Cutter
1.62	1.60	Style	1.60	Sort	1.60	Car	1.60	Clock
1.75	1.73	Sin	1.73	Scholar	1.73	Contra	1.73	Custom
2.00	1.98	Silver	1.98	Scent	1.98	Cool	1.97	Cushion
2.25	2.22	Silk	2.22	Scar	2.23	Concert	2.22	Curve
2.50	2.47	Sign	2.47	Scale	2.48	Copper	2.47	Cube
2.75	2.72	Siege	2.72	Saw	2.72	Copy	2.72	Cubic
3.00	2.96	Side	2.95	Sand	2.97	Coral	2.96	Cuckoo
3.25	3.21	Sick	3.20	Salt	3.22	Cord	3.21	Cudden
3.50	3.46	Shrew	3.45	Saint	3.47	Comet	3.45	Cue
3.75	3.71	Show	3.70	Saddle	3.72	Consort	3.70	Cuff
4.00	3.95	Show	3.95	Sabre	3.97	Corsair	3.95	Culture
4.25	4.20	Shoal	4.20	Sack	4.23	Cost	4.19	Cup
4.50	4.45	Ship	4.44	Saba	4.48	Cork	4.44	Cupola
4.75	4.70	Shield	4.68	Sacred	4.73	Count	4.69	Curlew
5.00	4.95	Sheet	4.93	Sail	4.98	Counter	4.93	Curtain
5.25	5.19	Sway	5.18	Spirit	5.24	Calk	5.18	Citizen
5.50	5.44	Sheath	5.43	Sage	5.49	Corona	5.43	Custard
5.75	5.69	Swell	5.67	Spline	5.75	Calibre	5.68	Circus
6.00	5.94	Sharp	5.92	Saline	6.01	Counsel	5.92	Cuban
6.50	6.44	Sextant	6.41	Sallet	6.52	Courage	6.41	Cuirass
7.00	6.94	Settle	6.90	Salve	7.04	Court	6.91	Cumber
7.50	7.44	Session	7.40	Saltant	7.55	Cow	7.40	Culvert
8.00	7.94	Service	7.89	Sandal	8.09	Crab	7.89	Cupid
8.50	8.44	String	8.38	Spoon				
9.00	8.94	Sebate	8.87	Sample				
9.50	9.44	Swipe	9.37	Spray				
10.00	9.94	Sedan	9.86	Salute				
10.50	10.46	Swival	10.35	Spring				
11.00	10.96	Secess	10.84	Sally				
12.00	11.97	Section	11.83	Sagene				
13.00	12.99	Secant	12.82	Sabian				
14.00	14.01	Secret	13.80	Sabot				
15.00	15.04	Secol	14.77	Save				
16.00	16.09	Secle	15.77	Sacrist				
18.00	18.18	Second	17.72	Savage				
20.00	20.34	Season	19.69	Saturn				

Cyl. D	TORIC + D_V	TORIC + Code	TORIC − D_V	TORIC − Code
0.12	0.13	Thatch	0.13	Tub
0.25	0.25	Theist	0.26	Tube
0.37	0.37	Thew	0.38	Tuck
0.50	0.50	Thing	0.51	Tuft
0.62	0.63	Thight	0.63	Tug
0.75	0.76	Thirst	0.76	Tulip
0.87	0.88	Thack	0.88	Tucan
1.00	1.02	Thole	1.02	Tune
1.12	1.14	Thallus	1.14	Tugger
1.25	1.27	Thong	1.28	Tunic
1.37	1.39	Tharms	1.40	Tull
1.50	1.52	Thorn	1.54	Turban
1.62	1.65	Theban	1.67	Tumbler
1.75	1.78	Thistle	1.80	Tumid
2.00	2.04	Thrash	2.06	Turf
2.25	2.29	Thread	2.29	Turn
2.50	2.55	Threat	2.55	Turret
2.75	2.82	Thresh	2.80	Turtle
3.00	3.09	Threw	3.06	Tusk
3.25	3.34	Thrift	3.31	Tutor
3.50	3.60	Thrill	3.57	Turnip
3.75	3.85	Thrive	3.82	Tumor
4.00	4.13	Throb	4.07	Tunnel
4.25	4.39	Throe	4.33	Turbot
4.50	4.65	Thorne	4.58	Tureen
4.75	4.92	Thrum	4.84	Turgid
5.00	5.20	Thrust	5.09	Twang
5.25	5.45	Thumb	5.35	Twig
5.50	5.71	Thump	5.61	Twill
5.75	5.99	Thwart	5.86	Twirl
6.00	6.28	Thyme	6.11	Twit

PRISMS

△	Code	△	Code	△	Code	△	Code
0.50	Pace	3.00	Palace	8.00	Pension	14.00	Pilgrim
0.75	Parish	3.50	Palette	9.00	Pepper	15.00	Pillow
1.00	Paddle	4.00	Panic	10.00	Period	16.00	Pine
1.50	Pagan	5.00	Parrot	11.00	Person	17.00	Plank
2.00	Pail	6.00	Peace	12.00	Petal	18.00	Play
						19.00	Plate
2.50	Paint	7.00	Pedal	13.00	Piece	20.00	Plume

PUNKTAL AND KATRAL FOCI AND CODE

Code for Sphero and Cylinder is for white lenses, finished on both sides. Add the name of color when colored lenses are ordered. Use Sphero and Cylinder code words for Sphero-Cylinder combinations.

PUNKTAL

SPHERO			CYLINDER		
Focus D_V	Code +	Code —	Focus D_V	Code +	Code —
0.25	Pabular	Pagadom	0.25	Palatal	Palestra
0.50	Pabulum	Paganic	0.50	Palate	Palestric
0.75	Paca	Paganize	0.75	Palatial	Palestrical
1.00	Pacable	Paganly	1.00	Palatic	Palet
1.25	Pacane	Page	1.25	Palatine	Paletot
1.50	Pacate	Pageant	1.50	Palato	Palewise
1.75	Pacation	Pagina	1.75	Palaver	Palfry
2.00	Paced	Pagine	2.00	Pale	Palgrave
2.25	Pacha	Pagod	2.25	Paleface	Pali
2.50	Pachalic	Pagodite	2.50	Palely	Paliform
2.75	Pachisi	Paguma	2.75	Paleness	Palling
3.00	Pachy	Pah	3.00	Palenque	Palinode
3.25	Pacific	Pahleyi	3.25	Paleo	Palisade
3.50	Pacify	Paid	3.50	Palelola	Palish
3.75	Pack	Paien	3.75	Paleous	Palkee
4.00	Package	Paigle	4.00	Palesie	Pall
4.25	Packer	Pailful			
4.50	Packling	Pailmail			
4.75	Packman	Pain			
5.00	Paco	Painable			
5.50	Pact	Painful			
6.00	Paction	Painim			
6.50	Pacu	Painless			
7.00	Pad	Pains			
7.50	.....	Painted			
8.00	.....	Painting			
8.50	.....	Paintless			
9.00	.....	Painture			
9.50	.....	Painty			
10.00	.....	Pairer			
10.50	.....	Pairing			
11.00	.....	Pairment			
12.00	.....	Paise			
13.00	.....	Pajock			
14.00	.....	Pakfong			
15.00	.....	Pal			
16.00	.....	Paldin			
18.00	.....	Palama			
20.00	.....	Palanka			

KATRAL

SPHERO		CYLINDER	
Focus D_V	Code +	Focus D_V	Code +
7.50	Palladic	0.50	Palmic
8.00	Pallah	1.00	Palmite
8.50	Pallet	1.50	Palmittin
9.00	Pallial	2.00	Palmy
9.50	Palliard	2.50	Palola
10.00	Palliate	3.00	Palp
10.50	Pallid	3.50	Palpable
11.00	Pallium	4.00	Palpator
11.50	Pallmall		
12.00	Pallone		
12.50	Pallor		
13.00	Palm		
13.50	Palmar		
14.00	Palmate		
14.50	Palmed		
15.00	Palmette		

THICKNESS OF UNCUT LENSES

Centex Lenses are supplied in Standard and Rimless thickness, with an allowance of .2 mm each way. The measurements are given in millimeters and are for the center of the lens.

Primex and Punktal lenses are computed for one thickness only.

Centex lenses can be supplied of a thickness varying from this schedule, on special order and at a special price.

Thickness of Meniscus lenses is given for 6.00 curve.

To determine the thickness in the center of Sphero-Cylinder lenses,

+ ⌓ +, add the foci of sphero and cylinder together and use convex cylinder table.

− ⌓ −, take sphero focus, using concave sphero table.

+ ⌓ −, take sphero focus, using convex cylinder table.

− ⌓ +, if sphero focus is greater, subtract cylinder from sphero and use the concave sphero table.

− ⌓ +, if cylinder focus is greater, subtract sphero from cylinder and use the convex cylinder table.

D	CENTEX																PUNKTAL		
	Dble. and Peris. + Oval and 42 mm.		Dble. and Peris. + 47 mm.		Meniscus + and Toric		Cyl. + Sph. Cyl. + ⌓ + 42 and 47 mm.		Dble. and Peris. — Oval		Dble. and Peris. + 42 and 47 mm.		Meniscus and Toric — Sph.-Cyl. —⌓—		Cylinder —		D_v	+	—
	Stan	Rim	Stan	Rim	Stan	Rim	Stan	Rim	Stan	Rim	Stan	Rim	Stan	Rim	Stan	Rim			
0 12	1.3	1.7	1.3	1.7	1.3	1.7	1.3	1.7	1.4	1.6	1.4	1.6	1.4	1.6	1.3	1.6			
0.25	1.3	1.7	1.3	1.7	1.3	1.7	1.3	1.7	1.4	1.6	1.4	1.6	1.4	1.6	1.3	1.6	0.25	1.4	1.5
0.37	1.3	1.7	1.3	1.7	1.3	1.7	1.3	1.7	1.4	1.6	1.4	1.6	1.4	1.6	1.3	1.6			
0.50	1.4	1.8	1.4	1.8	1.4	1.8	1.4	1.8	1.4	1.6	1.4	1.6	1.4	1.6	1.3	1.6	0.50	1.5	1.5
0.62	1.4	1.8	1.4	1.8	1.4	1.8	1.4	1.8	1.4	1.6	1.4	1.6	1.4	1.6	1.3	1.6			
0.75	1.4	1.8	1.4	1.8	1.4	1.8	1.4	1.8	1.3	1.5	1.3	1.5	1.3	1.5	1.3	1.6	0.75	1.7	1.5
0.87	1.5	1.9	1.5	1.9	1.5	1.9	1.5	1.9	1.3	1.5	1.3	1.5	1.3	1.5	1.3	1.6			
1.00	1.5	1.9	1.5	1.9	1.5	1.9	1.5	1.9	1.3	1.5	1.3	1.5	1.3	1.5	1.3	1.6	1 00	1.8	1.5
1.12	1.5	1.9	1.5	1.9	1.5	1.9	1.5	1.9	1.2	1.4	1.2	1.4	1.2	1.4	1.3	1.6			
1.25	1.6	2.0	1.6	2.0	1.6	2.0	1.6	2.0	1.2	1.4	1.2	1 4	1.2	1.4	1.3	1.6	1.25	1.8	1.4
1.37	1.6	2.0	1.6	2.0	1.6	2.0	1.6	2.0	1.1	1.3	1.1	1.3	1.1	1.3	1.3	1.6			
1.50	1.6	2.0	1.6	2.0	1.6	2.0	1.6	2.0	1.1	1.3	1.1	1.3	1.1	1.3	1.3	1.6	1.50	2.0	1.3
1.62	1.7	2.1	1.7	2.1	1.7	2.1	1.7	2.1	1.0	1.2	1.0	1.2	1.0	1.2	1.3	1.6			
1.75	1.7	2.1	1.7	2.1	1.7	2.1	1.7	2.1	1.0	1.2	1.0	1.2	1.0	1.2	1.3	1.6	1 75	2.1	1.2
2.00	1.8	2.2	1.8	2.2	1.8	2.2	1.8	2.2	1.0	1.2	1.0	1.2	1.0	1.2	1.3	1.6	2 00	2.2	1.1
2.25	1.9	2.3	1.9	2.3	1.9	2.3	1.9	2.3	0.9	1.1	0.9	1 1	0.9	1.1	1.3	1.6	2.25	2.3	1.1
2.50	1.9	2.3	1.9	2.3	1.9	2.3	1.9	2.3	0.8	1.0	0.8	1.0	0.8	1.0	1.2	1.5	2 50	2.4	1.0
2.75	2.0	2.4	2.0	2.4	2.0	2.4	2.0	2.4	0.8	1.0	0.8	1.0	0.8	1.0	1.2	1.5	2 75	2.5	1.0
3.00	2.1	2.5	2.1	2.5	2.1	2.5	2.1	2.5	0.7	0.9	0.7	0.9	0.7	0.9	1.2	1.5	3 00	2.6	0.9
3.25	2.2	2.6	2.2	2.6	2.2	2.6	2.2	2.6	0.6	0.8	0.6	0.8	0.6	0.8	1.2	1.5	3 25	2.7	0.9
3.50	2.3	2.7	2.3	2.7	2.3	2.7	2.3	2.7	0.6	0.8	0.6	0.8	0.6	0.8	1.2	1.5	3 50	2.8	0.8
3.75	2.4	2.8	2.4	2.8	2.4	2.8	2.4	2.8	0.6	0.8	0.6	0.8	0.6	0.8	1.2	1.5	3 75	3.0	0.8
4.00	2.5	2.9	2.5	2.9	2.5	2.9	2.5	2.9	0.6	0.8	0.6	0.8	0.6	0.8	1.2	1.5	4 00	3.1	0.7
4.25	2.6	3.0	2.6	3.0	2.6	3.0	2.6	3.0	0.6	0.8	0.6	0.8	0.6	0.8	1.2	1.5	4 25	3.2	0.7
4.50	2.6	3.0	2.6	3.0	2.8	3.1	2.6	3.0	0.6	0.8	0.6	0.8	0.6	0.8	1.2	1.5	4 50	3.3	0.6
4.75	2.7	3.1	2.7	3.1	2.9	3.2	2.7	3.1	0.6	0.8	0.6	0.8	0.6	0.8	1.2	1.5	4 75	3.4	0.6
5.00	2.8	3.2	2.9	3.3	3.0	3.3	2.9	3.3	0.5	0.7	0.5	0.7	0.5	0.7	1.2	1.5	5 00	3.5	0.6
5.25	2.9	3.3	3.0	3.4	3.1	3.4	3.0	3.4	0.5	0.7	0.5	0.7	0.5	0.7	1.2	1.5	5 50	3.7	0.5
5.50	3.0	3.4	3.1	3.5	3.2	3.5	3.1	3.5	0.5	0.7	0.5	0.7	0.5	0.7	1.2	1.5	6 00	4.0	0.5
5.75	3.1	3.5	3.2	3.6	3.3	3.6	3.2	3.6	0.5	0.7	0.5	0.7	0.5	0.7	1.2	1.5	6 50	4.2	0.5
6.00	3.2	3.6	3.4	3.7	3.6	3.8	3.4	3.7	0.5	0 7	0.5	0.7	0.5	0.7	1.2	1.5	7 00	4.4	0.5
6.50	3.4	3.8	3.6	3.9	3.9	...	3.6	3.9	0.5	0.7	0.5	0.7	0.5	0.7	1.2	1.5	7.50	4.6	0.5
7.00	3.6	4.0	3.9	4.1	4.2	...	3.9	4.1	0.5	0.7	0.5	0.7	0.5	0.7	1.2	1.5	8.00		
7.50	3.8	4.2	4.1	4.3	4.5	...	4.1	4.3	0.5	0.7	0.5	0.7	0.5	0.7	1.2	1.5	to		0.5
8.00	4.1	4.6	4.4	4.6	4.8	...	4.4	4.6	0.5	0.7	0.5	0.7	0.5	0.7	1.2	1 5	20.00		

42 mm ROUND									
D	Dble +	Peris +	D	Dble +	Peris +	D	Dble +	Peris +
8 50	4.2	4.2	11 00	5.1	5.1	16 00	6.9	7.0
9 00	4.3	4.3	12 00	5.4	5.4	18 00	7.8	8.1
9 50	4.5	4.5	13 00	5.7	5.7	20 00	8.8	9.4
10 00	4.7	4.7	14 00	6.1	6.1	.....	...	...
10 50	4.9	4.9	15.00	6.5	6.5	.....	...	...

PRISMS		
Edge Thickness	Stan	Rim
0.50 to 1 00	1.2	1.6
1 50 to 2.00	1.0	1.4
2.50 to 3 00	0.8	1.2
3.50 to 5 00	0.6	1.0
6 00 to 20.00	0.4	

TABLE OF MINIMUM QUANTITIES

The tables on this and the opposite page show quantities in pairs, constituting original packages for the various kinds of Centex lenses as they are put up for stock.

In order to obtain dozen prices, the quantities specified, or more of a kind and focus should be ordered and not less than six pairs in a division of focus numbers.

For broken packages, an extra charge of 40 cents per dozen pairs is made to cover additional cost of selecting and packing.

All lenses listed by the pair are not subject to extra charge.

Prescription Prices will be charged:

a: For all lenses not quoted by the dozen.

b: For special foci.

c: For less than six pairs—in a division of focus numbers or in Plano.

d: For lenses not regularly carried in stock, when ordered in small quantities.

	UNCUT					
	White	Color	0.12 to 2.00	2.25 to 4.25	4.50 to 6.00	6.50 to 8.00
Flat Blanks Moulded Blanks } One Standard Size, Shade or Thickness	12 12	12 12				
Plano Flat	12	12				
Plano 1.25 curve	12	6				
Plano 6.00 curve	12	6				
Plano 9.00 curve } One Standard Size or Shade	6	6				
Plano Rough Flat	12	6				
Plano Rough 1.25 curve	12	6				
Plano Rough 6.00 curve	12	6				
Plano Rough 9.00 curve } One Thickness, Size or Shade	6	6				
Plano + or − 42 mm and 47 mm round	..	..	6	6	3	3
Double + or − oval	..	..	12	12	12	12
Double + or − 42 mm round	..	..	6	6	6	6
Double + or − 47 mm round	..	..	6	6	3	3
Periscopic + or − Oval	..	..	12	12	12	12
Periscopic + or − 42 mm round	..	..	6	6	6	6
Periscopic + or − 47 mm round	..	..	6	6	6	6
Meniscus 6.00 curve + or − 47 mm round	..	..	12	12	6	6
Meniscus 9.00 curve + or − 47 mm round	..	..	6	6	3	3
Sphero, Colored, One Shade	..	..	3	3	3	3
Flat						
Cylinder Rough + or − 42 mm square or 47 mm round (one thickness) 2 to 4 mm thick	..	..	12	6	3	3
Cylinder Rough + or − 42 mm square or 47 mm round (one thickness) 5 to 10 mm thick	..	..	6	6	3	3
Cylinder Plano + or− 42 mm square	..	..	12	12	6	6
Cylinder Plano + or − 47 mm round	..	..	6	6	3	3
Sphero-Cylinder + ⊃ + or − ⊃ − 42 mm square	..	..	12	6	3	3
Sphero-Cylinder + ⊃ + or − ⊃ − 47 mm round	..	..	6	6	3	3
Sphero-Cylinder + ⊃ − or − ⊃ + 42 mm square	..	..	6	6	3	3
Sphero-Cylinder + ⊃ − or − ⊃ + 47 mm round	..	..	6	6	3	3
Cylinder, Colored, One Shade	..	..	3	3	3	3
Toric						
Cylinder Rough 6.00 and 9.00 curve (one thickness) 2 to 4 mm thick	..	..	12	6	3	3
Cylinder Rough 6.00 and 9.00 curve (one thickness) 5 to 10 mm thick	..	..	6	6	3	3
Cylinder Plano + or −	..	..	12	6	3	3
Sphero-Cylinder + ⊃ + and − ⊃ −	..	..	6	6		
Sphero-Cylinder + ⊃ − and − ⊃ +	..	..	6	6		
Cylinder, Colored, One Shade	..	..	3	3	3	3

TABLE OF MINIMUM QUANTITIES

(CONTINUED)

	UNCUT					
	White	Color	0.12 to 2.00	2.25 to 4.25	4.50 to 6.00	6.50 to 8.00
Coquille, Mi-Coquille } One Standard, Size or Shade	12	12				
	12	12				
Plano-Prisms 0.50 to 3.50 △	6					
Plano-Prisms 4.00 to 20.00 △	2					
Rough Prisms (one thickness) 0.50 to 3.50 △	2					
Sphero-Prisms 0.12 to 4.25+ S, 0.50 to 3.50 △	2					
Cylinder Prisms 0.12 to 4.25 + C, 0.50 to 3.50 △	2					
Wafers, Cement (1.25 c or Plano)	..	..	12	12	6	6
Wafers, Cement (− ⌓ + or + ⌓ +)	..	..	6	6	3	3
Wafers, Opifex	..	..	6	6	3	3

	EDGED					
	White	Color	0.12 to 2.00	2.25 to 4.25	4.50 to 6.00	6.50 to 8.00
Bifocals, Split	..	..	12	12	6	6
Bifocals, Cement	..	..	12	12	6	6
Bifocals, Perfection	..	..	12	12	6	6
Bifocals, Perfection Uppers	..	..	12	12	6	6
Bifocals, Perfection Lowers	..	..	12	12	6	6
Bifocals, Opifex	..	..	6	6	3	3
Plano Flat } One Standard Size or Shade	12	12				
Plano 1.25 curve	12	12				
Plano 6.00 curve	12	12				
Double, + or −	..	..	12	12	12	12
Periscopic, + or −	..	..	12	12	12	12
Meniscus, + or −	..	..	12	12	6	6
Plano-Cylinder, + or −	..	..	12	12	6	6
Sphero-Cylinder + ⌓ + and − ⌓ −	..	..	12	6		
Sphero-Cylinder + ⌓ − and − ⌓ +	..	..	6	6		
Toric Plano-Cylinder, + or −	..	..	12	6		
Toric Sphero-Cylinder, + ⌓ + and − ⌓ −	..	..	12	6		
Toric Sphero-Cylinder, + ⌓ − and − ⌓ +	..	..	6	6		
Coquille, Mi-Coquille } One Standard, Size or Shade	12	12				
	12	12				
Plano-Prisms, 0.50 to 3.50 △	6					
Plano-Prisms, 4.00 to 20.00 △	2					
Cylinder Prisms	2					
Wafers, Cement (1.25 c or Plano)	..	..	12	12	6	6
Wafers, Cement (− ⌓ +)	..	..	6	6	3	3
Wafers, Opifex	..	..	6	6	3	3

PRESCRIPTION BLANK

℞ BAUSCH & LOMB OPHTHALMIC LENSES

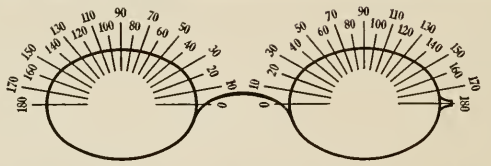
From

No. ..... *Date* .....

Check Form of Test Lens Used

DOUBLE ..... PLANO ..... MENISCUS .....

	RIGHT		LEFT	
	D	D_v	D	D_v
I. Sphero Test Lens:				
1) power P. D. ..... mm				
2) reading add. P. D. ..... mm				
II. Cylinder Test Lens:				
3) power				
4) axis	○	○	○	○
Check position of Cyl. in front or back of Sph. lens for all foci of 6.00 D and over	Front Back		Front Back	
III. Prism:				
5) power		△		△
6) location of base				
IV. Location of Test Lens:				
7) distance from inner surface of lens to cornea		mm		mm
8) distance between inner lens surfaces of Sph. and Cyl. lenses		mm		mm



Adopted at Naples Convention as International Standard

LENS SPECIFICATIONS

Centex ..... **Primex** ..... **Punktal** ..... **Katral** .....

Eye Size ..... Bevel Edge ..... Center .....

Lens Shape ..... Rimless Edge ..... Holes .....

FRAME MEASUREMENTS

Bridge, vertical adjustment ..... up ..... mm, down ..... mm

Bridge, horizontal adjustment ..... in ..... mm, out ..... mm

Frame Inclination ..... up ..... mm, down ..... mm

Temple ..... length ..... mm, height ..... mm

REMARKS

TO .....

.....

PRESCRIPTION BLANK DIRECTIONS

Believing it would be desirable for all concerned to establish a standard prescription blank for eye refraction, we offer and recommend the use of the form shown on the opposite page. This blank enables its user to record plainly and systematically the result of the examination, to be followed in grinding the lenses of whatever form prescribed in order to obtain the same correction as that of the original test lenses.

It is important to know the form of lens used in the test, and this should be indicated by a check mark in the space provided in prescription blank. Test lenses generally are based on the dioptric (D) method of refraction. They can be reduced, however, to the vertex system by the use of our Vertex Dioptrometer. It is also necessary to note the position of the cylinder—whether in front of, or behind, the sphero for all foci of 6.00 D, and over.

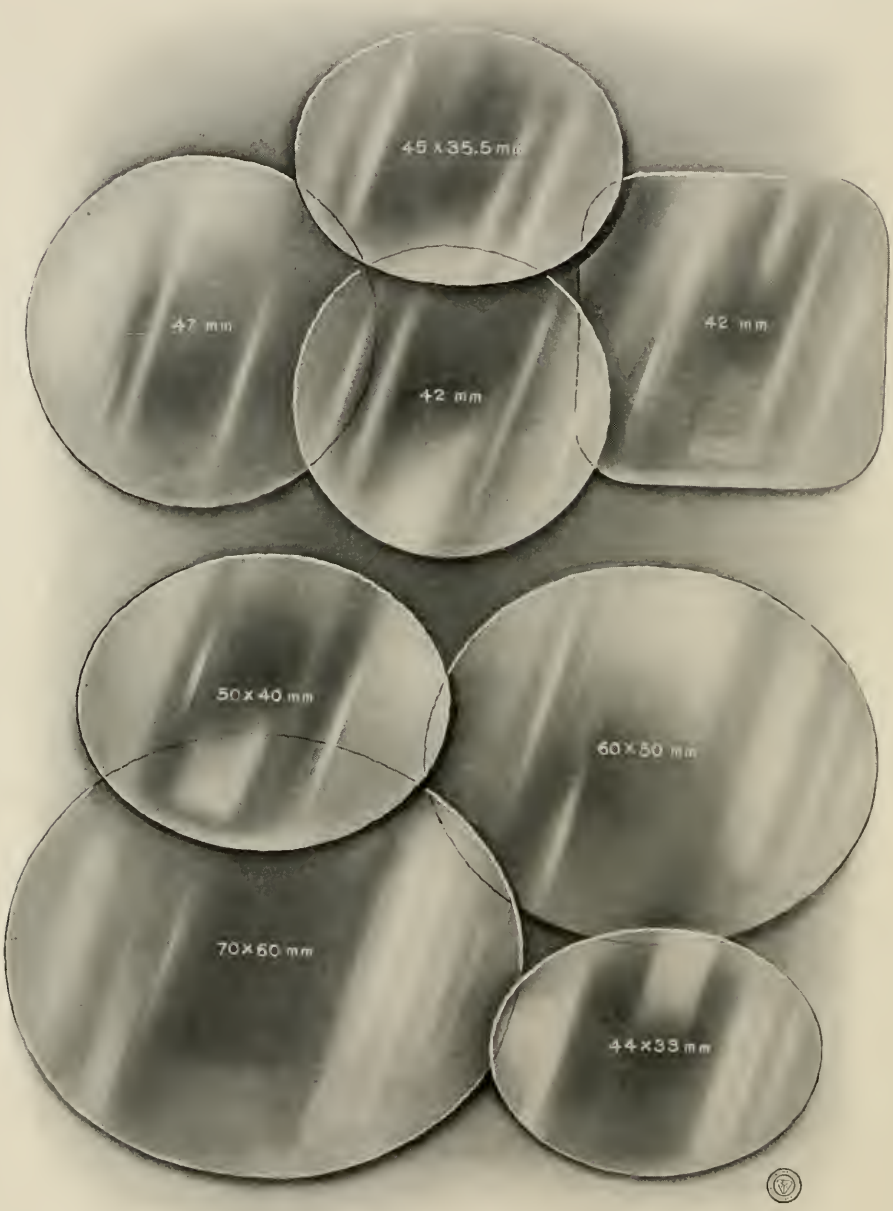
The distance between the apex of the cornea and the inner surface of the lens (7) should be noted, and when test combinations are used the distance between the inner surfaces of the lenses (8) should also be recorded. For strong lenses, this data is essential if the proper correction is to be obtained; this is particularly true in cataract cases, for which we recommend Katral lenses.

The oculist, optometrist or optician can secure all the required data by means of the following instruments, which are illustrated in our catalog of Ophthalmic Apparatus and in special descriptive circulars:

1. **Vertex Dioptrometer,** the use of which will enable the operator to determine the distance from the inner surface of any ophthalmic lens to the focal point and thus ascertain the D_V, or vertex refraction, of the lens
2. **Interpupillary Distance Gauge,** for quickly and accurately determining the pupillary distance for distance and reading.
3. **Keratometer,** for measuring the distance between the apex of the cornea and the inner surface of the lens, as required in the blank. It may also be used for measuring the diameter of the pupil.

SIZES OF UNCUT LENSES

These are regular sizes. In addition, we supply Plano-Rough, Meniscus Plano and Meniscus Rough lenses in 51, 57, 63, 71 and 80 mm diameters, round.



PRICES FOR UNCUT LENSES

PLANO-ROUGH, FLAT AND MENISCUS

(ONE SIDE GROUND AND POLISHED)

CENTEX

Per Dozen Pairs	ROUND					
	47 mm	51 mm	57 mm	63 mm	71 mm	80 mm
White						
Flat						
2 to 2.5 mm thick	$1.60					
3 to 4 mm thick	1.90					
5 to 7 mm thick	2.25					
8 to 10 mm thick	3.00					
1.25 Curve						
2 to 2.5 mm thick	1.85					
3 to 4 mm thick	2.15					
5 to 7 mm thick	2.50					
8 to 10 mm thick	3.25					
— 6.00 Curve						
2 to 2.5 mm thick	3.50	$5.00	$6.50	$8.00	$10.50	$13.00
3 to 4 mm thick	4.00	5.50	7.00	8.50	11.00	14.00
5 to 7 mm thick	4.50	6.00	7.50	9.00	11.50	15.00
8 to 10 mm thick	5.50	7.00	8.50	10.00	12.50	16.00
+ 6.00 Curve						
2 to 2.5 mm thick	4.25	5.75	8.00	10.00	13.00	16.00
3 to 4 mm thick	4.75	6.25	8.50	10.50	13.50	17.00
5 to 7 mm thick	5.25	6.75	9.00	11.00	14.00	18.00
8 to 10 mm thick	6.25	7.75	10.00	12.00	15.00	19.00
— 9.00 Curve						
2 to 2.5 mm thick	7.00					
3 to 4 mm thick	8.00					
5 to 7 mm thick	9.00					
8 to 10 mm thick	11.00					
+ 9.00 Curve						
2 to 2.5 mm thick	8.50					
3 to 4 mm thick	9.50					
5 to 7 mm thick	10.50					
8 to 10 mm thick	12.50					

PRICES FOR UNCUT LENSES

PLANO-ROUGH, FLAT AND MENISCUS

(ONE SIDE GROUND AND POLISHED)

CENTEX

Per Dozen Pairs	ROUND					
	47 mm	51 mm	57 mm	63 mm	71 mm	80 mm
Smoke and Blue						
Flat						
2 to 2.5 mm thick	$2.25					
3 to 4 mm thick	2.75					
5 to 7 mm thick	3.25					
8 to 10 mm thick	4.25					
1.25 Curve						
2 to 2.5 mm thick	2.50					
3 to 4 mm thick	3.00					
5 to 7 mm thick	3.50					
8 to 10 mm thick	4.50					
6.00 Curve						
2 to 2.5 mm thick	5.00	$7.00	$ 9.00	$11.00	$14.50	$18.00
3 to 4 mm thick	5.75	7.75	10.00	12.00	15.50	19.50
5 to 7 mm thick	6.50	8.50	11.00	13.00	16.50	21.00
8 to 10 mm thick	7.75	9.25	12.00	14.00	17.50	22.50
+ 6.00 Curve						
2 to 2.5 mm thick	6.00	8.00	11.00	13.50	18.00	22.00
3 to 4 mm thick	6.75	8.75	12.00	14.50	19.00	23.50
5 to 7 mm thick	7.50	9.50	13.00	15.50	20.00	25.00
8 to 10 mm thick	8.25	10.25	14.00	16.50	21.00	26.50
Amber						
Flat						
2 to 2.5 mm thick	3.00					
3 to 4 mm thick	3.50					
5 to 7 mm thick	4.00					
8 to 10 mm thick	4.50					
1.25 Curve						
2 to 2.5 mm thick	3.25					
3 to 4 mm thick	3.75					
5 to 7 mm thick	4.25					
8 to 10 mm thick	4.75					
− 6.00 Curve						
2 to 2.5 mm thick	6.50	8.75	11.50	14.00	18.50	22.75
3 to 4 mm thick	7.25	9.75	12.75	15.50	20.25	25.00
5 to 7 mm thick	8.00	10.75	14.00	17.00	22.00	27.25
8 to 10 mm thick	8.75	11.75	15.25	18.50	23.75	29.50
+ 6.00 Curve						
2 to 2.5 mm thick	7.50	10.00	14.00	17.50	22.75	28.00
3 to 4 mm thick	8.25	11.00	15.25	19.00	24.75	30.25
5 to 7 mm thick	9.00	12.00	16.50	20.50	26.75	32.50
8 to 10 mm thick	9.75	13.00	17.75	22.00	28.75	34.75

PRICES FOR UNCUT LENSES

PLANO-ROUGH, FLAT AND MENISCUS

(ONE SIDE GROUND AND POLISHED)

CENTEX

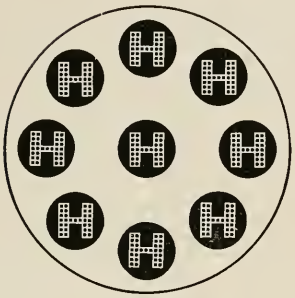
Per Dozen Pairs	ROUND					
	47 mm	51 mm	57 mm	63 mm	71 mm	80 mm
Amethyst						
Flat						
2 to 2.5 mm thick	$3.25					
3 to 4 mm thick	3.50					
5 to 7 mm thick	4.00					
8 to 10 mm thick	4.50					
1.25 Curve						
2 to 2.5 mm thick	3.75					
3 to 4 mm thick	4.00					
5 to 7 mm thick	4.50					
8 to 10 mm thick	5.00					
— 6.00 Curve						
2 to 2.5 mm thick	7.00	$10.00	$13.00	$16.00	$21.00	$26.00
3 to 4 mm thick	7.75	11.00	14.25	17.50	22.75	28.25
5 to 7 mm thick	8.50	12.00	15.50	19.00	24.50	30.50
8 to 10 mm thick	9.25	13.00	16.75	20.50	26.25	32.75
+ 6.00 Curve						
2 to 2.5 mm thick	8.50	11.50	16.00	20.00	26.00	32.00
3 to 4 mm thick	9.25	12.50	17.25	21.50	27.75	34.25
5 to 7 mm thick	10.00	13.50	18.50	23.00	29.50	36.50
8 to 10 mm thick	10.75	14.50	19.75	24.50	31.25	38.75
Fieuzal						
Flat						
2 to 2.5 mm thick	3.25					
3 to 4 mm thick	3.50					
5 to 7 mm thick	4.00					
8 to 10 mm thick	4.50					
1.25 Curve						
2 to 2.5 mm thick	3.75					
3 to 4 mm thick	4.00					
5 to 7 mm thick	4.50					
8 to 10 mm thick	5.00					
— 6.00 Curve						
2 to 2.5 mm thick	7.00	10.00	13.00	16.00	21.00	26.00
3 to 4 mm thick	7.75	11.00	14.25	17.50	22.75	28.25
5 to 7 mm thick	8.50	12.00	15.50	19.00	24.50	30.50
8 to 10 mm thick	9.25	13.00	16.75	20.50	26.25	32.75
+ 6.00 Curve						
2 to 2.5 mm thick	8.50	11.50	16.00	20.00	26.00	32.00
3 to 4 mm thick	9.25	12.50	17.25	21.50	27.75	34.25
5 to 7 mm thick	10.00	13.50	18.50	23.00	29.50	36.50
8 to 10 mm thick	10.75	14.50	19.75	24.50	31.25	38.75

PRICES FOR UNCUT LENSES

PLANO

(GROUND AND POLISHED ON BOTH SIZES)

CENTEX



OBJECT TARGET

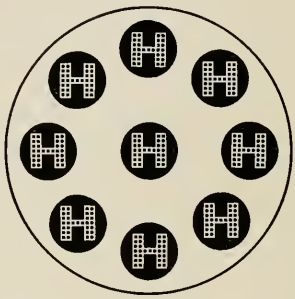


IMAGE AS SEEN THROUGH LENS

Plano lenses are made flat and in the following curves:

(*a*) FLAT: Oval and round; white and colored.
(*b*) 1.25 D. CURVE: Oval and round; white and colored.
(*c*) 6.00 D. CURVE: Round; white and colored.
(*d*) 9.00 D. CURVE: Round; white and colored.

White lenses are supplied regularly of our crown glass.

Colored lenses are supplied only in our standard shades with some variation of shade either way.

Colored lenses may be selected to approximate closely the shade of a sample within the limits of our regular shades, however, and at an extra price of $1.50 per dozen pairs.

Per Dozen Pairs	OVAL						
	44 x 34 mm		45 x 35.5 mm		50 x 40 mm	60 x 50 mm	70 x 60 mm
	Stan.	Rim.	Stan.	Rim.			
White							
Plano Flat	$1.10	$1.20	....	....	$1.75	$3.00	$4.00
Plano 1.25 Curve	....	....	$1.50	$1.60			
Smoke and Blue							
Plano Flat	1.50	1.60	....	....	2.50	4.25	5.50
Plano 1.25 Curve	....	....	2.00	2.10			
Amber							
Plano Flat	....	....	2.00	2.10	3.00	5.25	7.00
Plano 1.25 Curve	....	....	2.75	2.85			
Amethyst and Fieuzal							
Plano Flat	....	....	2.25	2.35	3.50	6.00	8.00
Plano 1.25 Curve	....	....	3.00	3.10			

PRICES FOR UNCUT LENSES

PLANO

(CONTINUED)

CENTEX

Per Dozen Pairs	ROUND								
	42 mm		47 mm		51 mm	57 mm	63 mm	71 mm	80 mm
	Stan.	Rim.	Stan.	Rim.					
White									
Plano Flat	$1.25	$1.40	$1.60	$1.85	$2.50	$3.00	$4.00	$5.25	$7.00
Plano 1.25 Curve	1.50	1.65	1.85	2.10	2.50	3.00	4.00	5.25	7.00
Plano 6.00 Curve	....	....	3.50	4.00	5.00	6.50	8.00	10.50	13.00
Plano 9.00 Curve	....	....	7.00						
Smoke									
Plano Flat	1.75	1.90	2.25	2.50	3.50	4.25	5.50	7.25	10.00
Plano 1.25 Curve	2.00	2.15	2.50	2.75	3.50	4.25	5.50	7.25	10.00
Plano 6.00 Curve	....	...	5.00	5.50	7.00	9.00	11.25	14.75	18.00
Plano 9.00 Curve	....	....	10.00						
Blue									
Plano Flat	1.75	1.90	2.25	2.50	3.50	4.25	5.50	7.25	10.00
Plano 1.25 Curve	2.00	2.15	2.50	2.75	3.50	4.25	5.50	7.25	10.00
Plano 6.00 Curve	....	....	5.00	5.50	7.00	9.00	11.25	14.75	18.00
Plano 9.00 Curve	....	....	10.00						
Amber									
Plano Flat	2.25	2.40	3.00	3.25	4.50	5.25	7.00	9.25	12.25
Plano 1.25 Curve	2.50	2.65	3.25	3.50	4.50	5.25	7.00	9.25	12.25
Plano 6.00 Curve	....	....	6.25	6.75	8.75	11.25	14.00	18.25	22.50
Plano 9.00 Curve	....	....	12.25						
Amethyst									
Plano Flat	2.50	2.65	3.25	3.50	5.00	6.00	8.00	10.50	14.00
Plano 1.25 Curve	3.00	3.15	3.75	4.00	5.00	6.00	8.00	10.50	14.00
Plano 6.00 Curve	....	....	7.00	7.50	10.00	13.00	16.00	21.00	26.00
Plano 9.00 Curve	....	....	14.00						
Fieuzal									
Plano Flat	2.50	2.65	3.25	3.50	5.00	6.00	8.00	10.50	14.00
Plano 1.25 Curve	3.00	3.15	3.75	4.00	5.00	6.00	8.00	10.50	14.00
Plano 6.00 Curve	....	....	7.00	7.50	10.00	13.00	16.00	21.00	26.00
Plano 9.00 Curve	....	....	14.00						

EXTRAS

Gauged lenses, ordered in mm thickness, which can be selected from stock:

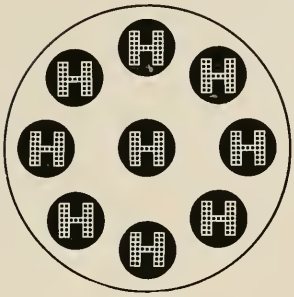
Oval	50 cents per dozen pairs extra.
42 mm Round	50 cents per dozen pairs extra.
47 mm Round	75 cents per dozen pairs extra.

Gauged lenses, ordered in mm thickness, which cannot be selected from stock, three times the price of regular lenses.

PRICES FOR UNCUT LENSES

PLANO AND DOUBLE

CENTEX



OBJECT TARGET

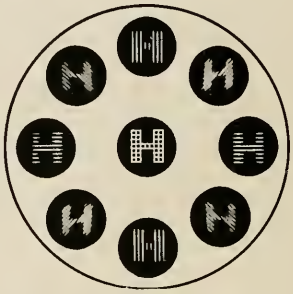


IMAGE AS SEEN THROUGH LENS

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs		OVAL 44 x 34 mm		ROUND 42 mm		ROUND 47 mm	
		Stan.	Rim.	Stan.	Rim.	Stan.	Rim.
Plano							
0.12 to 2.00	+ or −	....	....	$1.50	$1.65	$2.00	$2.25
2.25 to 4.25	+ or −	....	....	1.75	1.90	2.50	2.75
4.50 to 6.00	+ or −	....	....	2.00	2.15	3.00	3.25
6.50 to 8.00	+ or −	....	....	2.50	2.65	3.75	4.00
8.50 to 10.00	+ or −	....	....	3.00			
10.50 to 13.00	+ or −	....	....	4.50			
14.00 to 16.00	+ or −	....	....	6.00			
18.00 to 20.00	+ or −	....	....	7.50			
Double							
0.12 to 2.00	+ or −	$1.15	$1.25	1.25	1.40	2.00	2.25
2.25 to 4.25	+ or −	1.40	1.50	1.50	1.65	2.50	2.75
4.50 to 6.00	+ or −	1.65	1.75	1.75	1.90	3.00	3.25
6.50 to 8.00	+ or −	1.90	2.00	2.00	2.15	3.75	4.00
8.50 to 10.00	+ or −	....	....	2.50			
10.50 to 13.00	+ or −	....	....	3.50			
14.00 to 16.00	+ or −	....	....	4.50			
18.00 to 20.00	+ or −	....	....	6.00			

EXTRAS

Lenses centered (center indicated) 15 cents per dozen pairs extra.

Gauged lenses ordered in mm thickness, which can be selected from stock,

44 x 34 Oval, 50 cents per dozen pairs extra.

42 mm Round, 50 cents per dozen pairs extra.

47 mm Round, 75 cents per dozen pairs extra.

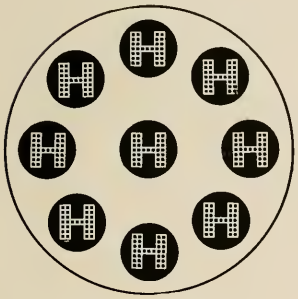
Gauged lenses, ordered in mm thickness, which cannot be selected from stock, three times the price of regular lenses.

PRICES FOR UNCUT LENSES

PERISCOPIC

(1.25 CURVE)

CENTEX



OBJECT TARGET

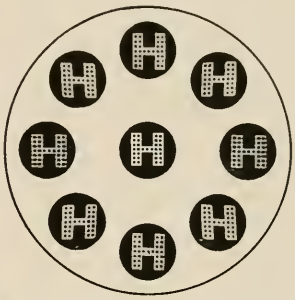


IMAGE AS SEEN THROUGH LENS

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs		OVAL 45 x 35.5 mm		ROUND 42 mm		ROUND 47 mm	
		Stan.	Rim.	Stan.	Rim.	Stan.	Rim.
White							
0.12 to 2.00	+ or −	$1.50	$1.60	$1.75	$1.90	$2.00	$2.25
2.25 to 4.25	+ or −	1.75	1.85	2.00	2.15	2.50	2.75
4.50 to 6.00	+ or −	2.00	2.10	2.25	2.40	3.00	3.25
6.50 to 8.00	+ or −	2.50	2.60	2.75	2.90	3.75	4.00
8.50 to 10.00	+ or −	....	....	3.50			
10.50 to 13.00	+ or −	....	....	4.50			
14.00 to 16.00	+ or −	....	....	6.00			
18.00 to 20.00	+ or −	....	....	7.50			
Smoke and Blue							
0.12 to 2.00	+ or −	2.00	2.20	....	....	3.00	3.35
2.25 to 4.25	+ or −	2.50	2.70	....	....	3.50	3.85
4.50 to 6.00	+ or −	3.00	3.20	....	....	4.25	4.60
6.50 to 8.00	+ or −	3.50	3.70	....	....	5.25	5.60
Amber							
0.12 to 2.00	+ or −	2.75	2.95	....	....	3.50	3.85
2.25 to 4.25	+ or −	3.25	3.45	....	....	4.25	4.60
4.50 to 6.00	+ or −	4.00	4.20	...	...	5.25	5.60
6.50 to 8.00	+ or −	5.00	5.20	....	....	6.50	6.85
Amethyst and Fieuzal							
0.12 to 2.00	+ or −	3.00	3.20	....	...	4.00	4.35
2.25 to 4.25	+ or −	3.50	3.70	....	....	5.00	5.35
4.50 to 6.00	+ or −	4.00	4.20	....	....	6.00	6.35
6.50 to 8.00	+ or −	5.00	5.20	....	....	7.50	7.85

EXTRAS

Lenses centered (center indicated), 15 cents per dozen pairs extra.
Gauged lenses, ordered in mm thickness, which can be selected from stock.

Oval	50 cents per dozen pairs extra.
42 mm Round	50 cents per dozen pairs extra.
47 mm Round	75 cents per dozen pairs extra.

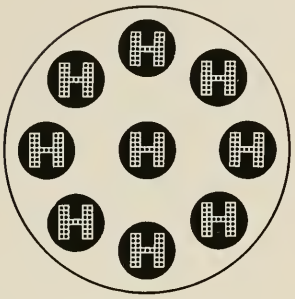
Gauged lenses, ordered in mm thickness, which cannot be selected from stock, three times the price of regular lenses.

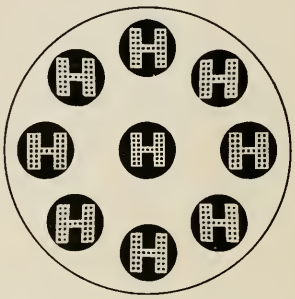
PRICES FOR UNCUT LENSES

MENISCUS

(6.00 AND 9.00 CURVE)

CENTEX





OBJECT TARGET — IMAGE AS SEEN THROUGH LENS

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs	ROUND 47 mm Standard	ROUND 47 mm Rimless	Per Dozen Pairs	ROUND 47 mm Standard	ROUND 47 mm Rimless
White			**Smoke and Blue**		
− 6.00 Curve			**− 6.00 Curve**		
0.12 to 2.00 +	$ 4.50	$ 5.00	0.12 to 2.00 +	$ 6.50	$ 7.00
2.25 to 4.25 +	6.00	6.50	2.25 to 4.25 +	8.50	9.00
4.50 to 6.00 +	7.50	8.00	4.50 to 6.00 +	10.50	11.00
6.50 to 8.00 +	9.00	9.50	6.50 to 8.00 +	12.50	13.00
+ 6.00 Curve			**+ 6.00 Curve**		
0.12 to 2.00 −	6.00	6.50	0.12 to 2.00 −	8.50	9.00
2.25 to 4.25 −	7.50	8.00	2.25 to 4.25 −	10.50	11.00
4.50 to 6.00 −	9.00	9.50	4.50 to 6.00 −	12.50	13.00
6.50 to 8.00 −	12.00	12.50	6.50 to 8.00 −	16.75	17.25
White			**Amber**		
− 9.00 Curve			**− 6.00 Curve**		
0.12 to 2.00 +	9.00	9.50	0.12 to 2.00 +	8.00	8.50
2.25 to 4.25 +	12.00	12.50	2.25 to 4.25 +	10.50	11.00
4.50 to 6.00 +	15.00	15.50	4.50 to 6.00 +	13.00	13.50
6.50 to 8.00 +	18.00	18.50	6.50 to 8.00 +	15.75	16.25
+ 9.00 Curve			**+ 6.00 Curve**		
0.12 to 2.00 −	12.00	12.50	0.12 to 2.00 −	10.50	11.00
2.25 to 4.25 −	15.00	15.50	2.25 to 4.25 −	13.00	13.50
4.50 to 6.00 −	18.00	18.50	4.50 to 6.00 −	15.75	16.25
6.50 to 8.00 −	24.00	24.50	6.50 to 8.00 −	21.00	21.50

PRICES FOR UNCUT LENSES

MENISCUS

(6.00 AND 9.00 CURVE)

(CONTINUED)

CENTEX

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs		ROUND 47 mm Standard	ROUND 47 mm Rimless
Amethyst			
— 6.00 Curve			
0.12 to 2.00	+	$ 9.00	$ 9.50
2.25 to 4.25	+	12.00	12.50
4.50 to 6.00	+	15.00	15.50
6.50 to 8.00	+	18.00	18.50
+ 6.00 Curve			
0.12 to 2.00	−	12.00	12.50
2.25 to 4.25	−	15.00	15.50
4.50 to 6.00	−	18.00	18.50
6.50 to 8.00	−	24.00	24.50

Per Dozen Pairs		ROUND 47 mm Standard	ROUND 47 mm Rimless
Fieuzal			
— 6.00 Curve			
0.12 to 2.00	+	$ 9.00	$ 9.50
2.25 to 4.25	+	12.00	12.50
4.50 to 6.00	+	15.00	15.50
6.50 to 8.00	+	18.00	18.50
+ 6.00 Curve			
0.12 to 2.00	−	12.00	12.50
2.25 to 4.25	−	15.00	15.50
4.50 to 6.00	−	18.00	18.50
6.50 to 8.00	−	24.00	24.50

EXTRAS

Lenses, centered (center indicated) 15 cents per dozen pairs extra.

Gauged lenses, ordered in mm thickness, which can be selected from stock, $1.50 per dozen pairs extra.

Gauged lenses, ordered in mm thickness, which cannot be selected from stock, prices on request.

PRICES FOR UNCUT LENSES

FLAT ROUGH CYLINDER

CENTEX

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

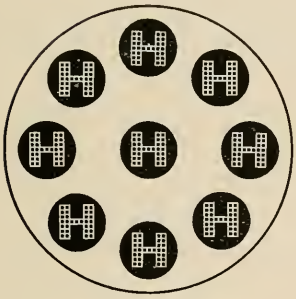
Per Dozen Pairs		SQUARE 42 mm	ROUND 47 mm
White-Rough (Cyl. side ground and polished)			
0.12 to 2.00	+ or − 2 to 2.5 mm thick	$2.00	$2.50
2.25 to 4.25		2.50	3.00
4.50 to 6.00		3.00	4.00
6.50 to 8.00		3.75	5.00
0.12 to 2.00	+ or − 3 to 4 mm thick	2.25	2.75
2.25 to 4.25		2.75	3.25
4.50 to 6.00		3.25	4.25
6.50 to 8.00		4.00	5.25
0.12 to 2.00	+ or − 5 to 7 mm thick	2.75	3.25
2.25 to 4.25		3.25	3.75
4.50 to 6.00		3.75	4.75
6.50 to 8.00		4.50	5.75
0.12 to 2.00	+ or − 8 to 10 mm thick	3.50	4.00
2.25 to 4.25		4.00	4.50
4.50 to 6.00		4.50	5.50
6.50 to 8.00		5.25	6.50
Smoke- and Blue-Rough (Cyl. side ground and polished)			
0.12 to 2.00	+ or − 2 to 2.5 mm thick	2.75	3.50
2.25 to 4.25		3.50	4.25
4.50 to 6.00		4.25	5.50
6.50 to 8.00		5.25	7.00
0.12 to 2.00	+ or − 3 to 4 mm thick	3.25	3.75
2.25 to 4.25		3.75	4.50
4.50 to 6.00		4.50	5.75
6.50 to 8.00		5.50	7.25
0.12 to 2.00	+ or − 5 to 7 mm thick	3.75	4.50
2.25 to 4.25		4.50	5.25
4.50 to 6.00		5.25	6.50
6.50 to 8.00		6.25	8.00
0.12 to 2.00	+ or − 8 to 10 mm thick	5.00	5.50
2.25 to 4.25		5.75	6.25
4.50 to 6.00		6.25	7.50
6.50 to 8.00		7.25	9.00

Per Dozen Pairs		SQUARE 42 mm	ROUND 47 mm
Amber-Rough (Cyl. side ground and polished)			
0.12 to 2.00	+ or − 2 to 2.5 mm thick	$3.50	$ 4.50
2.25 to 4.25		4.25	5.25
4.50 to 6.00		5.25	7.00
6.50 to 8.00		6.50	8.75
0.12 to 2.00	+ or − 3 to 4 mm thick	4.00	5.00
2.25 to 4.25		4.75	5.75
4.50 to 6.00		5.75	7.50
6.50 to 8.00		7.00	9.25
0.12 to 2.00	+ or − 5 to 7 mm thick	4.75	5.75
2.25 to 4.25		5.50	6.50
4.50 to 6.00		6.50	8.25
6.50 to 8.00		7.75	10.00
0.12 to 2.00	+ or − 8 to 10 mm thick	6.25	7.00
2.25 to 4.25		7.00	7.75
4.50 to 6.00		8.00	9.50
6.50 to 8.00		9.25	11.25
Amethyst- and Fieuzal-Rough (Cyl. side ground and polished)			
0.12 to 2.00	+ or − 2 to 2.5 mm thick	...	5.00
2.25 to 4.25		....	6.00
4.50 to 6.00		....	8.00
6.50 to 8.00		....	10.00
0.12 to 2.00	+ or − 3 to 4 mm thick	....	5.50
2.25 to 4.25		....	6.50
4.50 to 6.00		....	8.50
6.50 to 8.00		....	10.50
0.12 to 2.00	+ or − 5 to 7 mm thick	....	6.50
2.25 to 4.25		....	7.50
4.50 to 6.00		....	9.50
6.50 to 8.00		....	11.50
0.12 to 2.00	+ or − 8 to 10 mm thick	....	8.00
2.25 to 4.25		....	9.00
4.50 to 6.00		....	11.00
6.50 to 8.00		....	13.00

PRICES FOR UNCUT LENSES

FLAT PLANO-CYLINDER

CENTEX



OBJECT TARGET

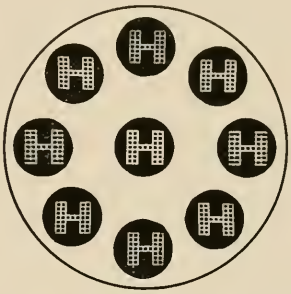


IMAGE AS SEEN THROUGH LENS

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs		SQUARE 42 mm		ROUND 47 mm	
		Stan.	Rim.	Stan.	Rim.
White					
0.12 to 2.00	+ or −	$2.00	$2.25	$2.50	$2.85
2.25 to 4.25	+ or −	2.50	2.75	3.00	3.35
4.50 to 6.00	+ or −	3.00	3.25	4.00	4.35
6.50 to 8.00	+ or −	3.75	4.00	5.00	5.35
Smoke and Blue					
0.12 to 2.00	+ or −	2.75	3.10	3.50	4.00
2.25 to 4.25	+ or −	3.50	3.85	4.25	4.75
4.50 to 6.00	+ or −	4.25	4.60	5.50	6.00
6.50 to 8.00	+ or −	5.25	5.60	7.00	7.50
Amber					
0.12 to 2.00	+ or −	3.50	3.85	4.50	5.00
2.25 to 4.25	+ or −	4.25	4.60	5.25	5.75
4.50 to 6.00	+ or −	5.25	5.60	7.00	7.50
6.50 to 8.00	+ or −	6.50	6.85	8.75	9.25
Amethyst and Fieuzal					
0.12 to 2.00	+ or −	....	....	5.00	5.50
2.25 to 4.25	+ or −	....	....	6.00	6.50
4.50 to 6.00	+ or −	....	....	8.00	8.50
6.50 to 8.00	+ or −	....	....	10.00	10.50

EXTRAS

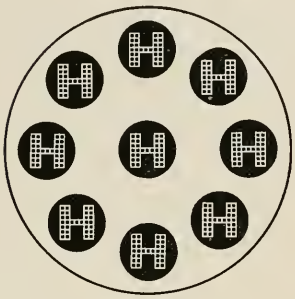
Lenses, ordered in mm thickness, which can be selected from stock, $1.50 per dozen pairs extra.

Gauged lenses, ordered in mm thickness, which cannot be selected from stock, prices on request.

PRICES FOR UNCUT LENSES

FLAT SPHERO-CYLINDER AND CROSS-CYLINDER

CENTEX



OBJECT TARGET

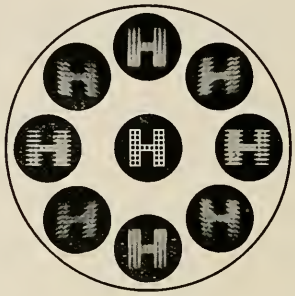


IMAGE AS SEEN THROUGH LENS

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs	SQUARE 42 mm		ROUND 47 mm	
	Stan.	Rim.	Stan.	Rim.
Sphero-Cylinder				
0.12 to 2.00 } + ○ +	$3.50	$3.85	$4.50	$5.00
2.25 to 4.25 } or	4.50	4.85	6.00	6.50
4.50 to 6.00 } − ○ −	6.00	6.35	7.50	8.00
6.50 to 8.00 }	7.50	7.85	9.00	9.50
0.12 to 2.00 } + ○ −	5.00	5.35	6.00	6.50
2.25 to 4.25 } or	6.00	6.35	7.50	8.00
4.50 to 6.00 } − ○ +	7.50	7.85	9.00	9.50
6.50 to 8.00 }	9.00	9.35	10.50	11.00
Cross-Cylinder				
0.12 to 2.00 }	9.00	9.35		
2.25 to 4.25 } + or −	10.00	10.35		
4.50 to 6.00 }	12.00	12.35		
6.50 to 8.00 }	15.00	15.35		

EXTRAS

Lenses, ordered in mm thickness, which can be selected from stock, $1.50 per dozen pairs extra.

Gauged lenses, ordered in mm thickness, which cannot be selected from stock, prices on request.

PRICES FOR UNCUT LENSES

TORIC ROUGH CYLINDER

(6.00 AND 9.00 CURVE)

(TORIC SIDE GROUND AND POLISHED)

CENTEX

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs		SQUARE 47 mm	Per Dozen Pairs		SQUARE 47 mm
White +6.00 Curve			**White +9.00 Curve**		
0.12 to 2.00	2 to 2.5 mm thick	$ 6.00	0.12 to 2.00	2 to 2.5 mm thick	$12.00
2.25 to 4.25		7.50	2.25 to 4.25		15.00
4.50 to 6.00		9.00	4.50 to 6.00		18.00
6.50 to 8.00		13.50	6.50 to 8.00		24.00
0.12 to 2.00	3 to 4 mm thick	6.75	0.12 to 2.00	3 to 4 mm thick	13.50
2.25 to 4.25		8.25	2.25 to 4.25		16.50
4.50 to 6.00		9.75	4.50 to 6.00		19.50
6.50 to 8.00		14.25	6.50 to 8.00		25.50
0.12 to 2.00	5 to 7 mm thick	7.50	0.12 to 2.00	5 to 7 mm thick	15.00
2.25 to 4.25		9.00	2.25 to 4.25		18.00
4.50 to 6.00		10.50	4.50 to 6.00		21.00
6.50 to 8.00		15.00	6.50 to 8.00		27.00
0.12 to 2.00	8 to 10 mm thick	9.00	0.12 to 2.00	8 to 10 mm thick	18.00
2.25 to 4.25		10.50	2.25 to 4.25		21.00
4.50 to 6.00		12.00	4.50 to 6.00		24.00
6.50 to 8.00		16.50	6.50 to 8.00		30.00
White −6.00 Curve			**Smoke +6.00 Curve**		
0.12 to 2.00	2 to 2.5 mm thick	7.50	0.12 to 2.00	2 to 2.5 mm thick	8.50
2.25 to 4.25		9.00	2.25 to 4.25		10.50
4.50 to 6.00		12.00	4.50 to 6.00		12.50
6.50 to 8.00		18.00	6.50 to 8.00		16.75
0.12 to 2.00	3 to 4 mm thick	8.25	0.12 to 2.00	3 to 4 mm thick	9.50
2.25 to 4.25		9.75	2.25 to 4.25		11.50
4.50 to 6.00		12.75	4.50 to 6.00		13.75
6.50 to 8.00		18.75	6.50 to 8.00		18.25
0.12 to 2.00	5 to 7 mm thick	9.00	0.12 to 2.00	5 to 7 mm thick	10.50
2.25 to 4.25		10.50	2.25 to 4.25		12.50
4.50 to 6.00		13.50	4.50 to 6.00		15.00
6.50 to 8.00		19.50	6.50 to 8.00		19.75
0.12 to 2.00	8 to 10 mm thick	10.50	0.12 to 2.00	8 to 10 mm thick	12.50
2.25 to 4.25		12.00	2.25 to 4.25		14.75
4.50 to 6.00		15.00	4.50 to 6.00		17.50
6.50 to 8.00		21.00	6.50 to 8.00		22.25

PRICES FOR UNCUT LENSES
TORIC ROUGH CYLINDER
(6.00 AND 9.00 CURVE)
(TORIC SIDE GROUND AND POLISHED)
(CONTINUED)

CENTEX

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs		SQUARE 47 mm
Blue		
+ 6.00 Curve		
0.12 to 2.00	2 to 2.5 mm thick	$ 8.50
2.25 to 4.25		10.50
4.50 to 6.00		12.50
6.50 to 8.00		16.75
0.12 to 2.00	3 to 4 mm thick	9.50
2.25 to 4.25		11.50
4.50 to 6.00		13.75
6.50 to 8.00		18.25
0.12 to 2.00	5 to 7 mm thick	10.50
2.25 to 4.25		12.50
4.50 to 6.00		15.00
6.50 to 8.00		19.75
0.12 to 2.00	8 to 10 mm thick	12.50
2.25 to 4.25		14.75
4.50 to 6.00		17.50
6.50 to 8.00		22.25
Amber		
+ 6.00 Curve		
0.12 to 2.00	2 to 2.5 mm thick	10.50
2.25 to 4.25		13.00
4.50 to 6.00		15.75
6.50 to 8.00		21.00
0.12 to 2.00	3 to 4 mm thick	11.75
2.25 to 4.25		14.50
4.50 to 6.00		17.25
6.50 to 8.00		22.50
0.12 to 2.00	5 to 7 mm thick	13.00
2.25 to 4.25		16.00
4.50 to 6.00		19.00
6.50 to 8.00		24.50
0.12 to 2.00	8 to 10 mm thick	15.50
2.25 to 4.25		18.50
4.50 to 6.00		21.50
6.50 to 8.00		27.00

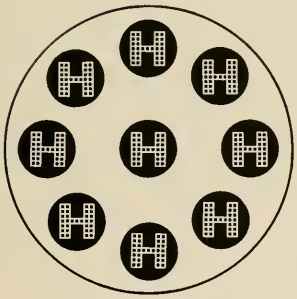
Per Dozen Pairs		SQUARE 47 mm
Amethyst		
+ 6.00 Curve		
0.12 to 2.00	2 to 2.5 mm thick	$12.00
2.25 to 4.25		15.00
4.50 to 6.00		18.00
6.50 to 8.00		24.00
0.12 to 2.00	3 to 4 mm thick	13.50
2.25 to 4.25		16.50
4.50 to 6.00		19.50
6.50 to 8.00		25.50
0.12 to 2.00	5 to 7 mm thick	15.00
2.25 to 4.25		18.00
4.50 to 6.00		21.00
6.50 to 8.00		27.00
0.12 to 2.00	8 to 10 mm thick	18.00
2.25 to 4.25		21.00
4.50 to 6.00		24.00
6.50 to 8.00		30.00
Fieuzal		
+ 6.00 Curve		
0.12 to 2.00	2 to 2.5 mm thick	12.00
2.25 to 4.25		15.00
4.50 to 6.00		18.00
6.50 to 8.00		24.00
0.12 to 2.00	3 to 4 mm thick	13.50
2.25 to 4.25		16.50
4.50 to 6.00		19.50
6.50 to 8.00		25.50
0.12 to 2.00	5 to 7 mm thick	15.00
2.25 to 4.25		18.00
4.50 to 6.00		21.00
6.50 to 8.00		27.00
0.12 to 2.00	8 to 10 mm thick	18.00
2.25 to 4.25		21.00
4.50 to 6.00		24.00
6.50 to 8.00		30.00

PRICES FOR UNCUT LENSES

TORIC PLANO-CYLINDER

(6.00 AND 9.00 CURVE)

CENTEX



OBJECT TARGET

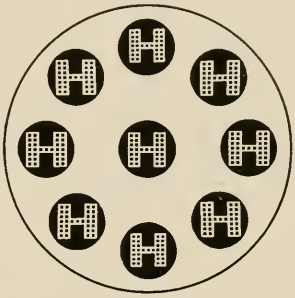


IMAGE AS SEEN THROUGH LENS

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs	SQUARE 47 mm Stan.	SQUARE 47 mm Rim.
Plano-Cylinder White		
+ 6.00 Curve		
0.12 to 2.00	$ 9.00	$ 9.50
2.25 to 4.25	12.00	12.50
4.50 to 6.00	15.00	15.50
6.50 to 8.00	18.00	18.50
+ 6.00 Curve		
0.12 to 2.00	12.00	12.50
2.25 to 4.25	15.00	15.50
4.50 to 6.00	18.00	18.50
6.50 to 8.00	24.00	24.50
+ 9.00 Curve		
0.12 to 2.00	18.00	18.50
2.25 to 4.25	21.00	21.50
4.50 to 6.00	24.00	24.50
6.50 to 8.00	30.00	30.50

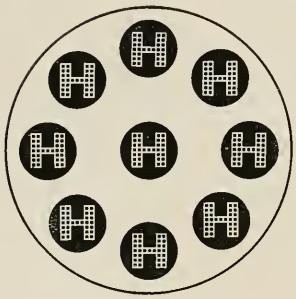
Per Dozen Pairs	SQUARE 47 mm Stan.	SQUARE 47 mm Rim.
Plano-Cylinder Colored		
+ 6.00 Curve		
Blue and Smoke		
0.12 to 2.00	$12.60	$13.10
2.25 to 4.25	16.80	17.30
4.50 to 6.00	21.00	21.50
6.50 to 8.00	25.20	25.70
Amber		
0.12 to 2.00	15.75	16.25
2.25 to 4.25	21.00	21.50
4.50 to 6.00	26.25	26.75
6.50 to 8.00	31.50	32.00
Fieuzal and Amethyst		
0.12 to 2.00	18.00	18.50
2.25 to 4.25	24.00	24.50
4.50 to 6.00	30.00	30.50
6.50 to 8.00	36.00	36.50

EXTRAS

Gauged lenses, ordered in millimeter thickness, which can be selected from stock, $1.50 per dozen pairs extra.

Gauged lenses, ordered in millimeter thickness, which cannot be selected from stock, prices on request.

PRICES FOR UNCUT LENSES
TORIC SPHERO-CYLINDER
(6.00 AND 9.00 CURVE)
CENTEX



OBJECT TARGET

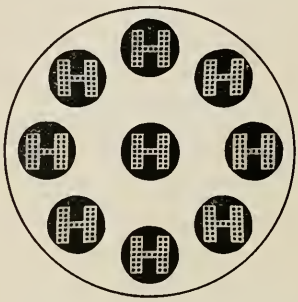


IMAGE AS SEEN THROUGH LENS

White lenses are supplied regularly of our Crown Glass.
Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs	SQUARE 47 mm Stan.	SQUARE 47 mm Rim.
Sphero-Cylinder White		
+ 6.00 Curve		
+ ⌓ +		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 6.00 S	$10.50 / 13.00	$11.00 / 13.50
— 6.00 Curve		
+ ⌓ +		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 6.00 S	13.25 / 15.75	13.75 / 16.25
+ 9.00 Curve		
+ ⌓ +		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 6.00 S	21.00 / 23.50	21.50 / 24.00
+ 6.00 Curve		
− ⌓ −, + ⌓ − or − ⌓ +		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 2.00 S	12.00 / 15.00	12.50 / 15.50
0.12 to 2.00 C / 2.25 to 4.25 C } 2.25 to 4.25 S	15.00 / 18.00	15.50 / 18.50
— 6.00 Curve		
+ ⌓ −		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 2.00 S	13.25 / 15.75	13.75 / 16.25

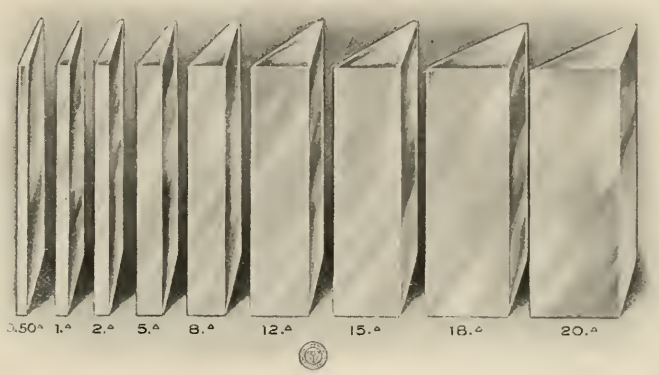
Per Dozen Pairs	SQUARE 47 mm Stan.	SQUARE 47 mm Rim.
Sphero-Cylinder Colored		
+ 6.00 Curve		
Blue and Smoke		
+ ⌓ +		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 6.00 S	$14.70 / 18.20	$15.20 / 18.70
− ⌓ −		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 2.00 S	14.70 / 18.20	15.20 / 18.70
0.12 to 2.00 C / 2.25 to 4.25 C } 2.25 to 4.25 S	17.50 / 21.00	18.00 / 21.50
Amber		
+ ⌓ +		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 6.00 S	18.40 / 22.75	18.90 / 23.25
− ⌓ −		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 2.00 S	18.40 / 22.75	18.90 / 23.25
0.12 to 2.00 C / 2.25 to 4.25 C } 2.25 to 4.25 S	21.90 / 26.25	22.40 / 26.75
Fieuzal and Amethyst		
+ ⌓ +		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 6.00 S	21.00 / 26.00	21.50 / 26.50
− ⌓ −		
0.12 to 2.00 C / 2.25 to 4.25 C } 0.12 to 2.00 S	21.00 / 26.00	21.50 / 26.50
0.12 to 2.00 C / 2.25 to 4.25 C } 2.25 to 4.25 S	25.00 / 30.00	25.50 / 30.50

EXTRAS—Gauged lenses, ordered in millimeter thickness, which can be selected from stock, $1.50 per dozen pairs extra.

PRICES FOR UNCUT LENSES

ROUGH, PLANO, SPHERO AND CYLINDER PRISMS

CENTEX



White lenses are supplied regularly of our Crown Glass.
Prices for edging prisms may be found on page 110.

Per Dozen Pairs		SQUARE 42 mm	
		Standard	Rimless
Rough (One side ground and polished)			
0.50 to 3.50△	2 to 2.5 mm thick	$3.75	
4.00 to 7.00△		4.25	
8.00 to 10.00△		5.00	
0.50 to 3.50△	3 to 4 mm thick	4.00	
4.00 to 7.00△		4.50	
8.00 to 10.00△		5.25	
0.50 to 3.50△	5 to 7 mm thick	4.50	
4.00 to 7.00△		5.00	
8.00 to 10.00△		5.75	
0.50 to 3.50△	8 to 10 mm thick	5.25	
4.00 to 7.00△		5.75	
8.00 to 10.00△		6.50	

PRICES FOR UNCUT LENSES

ROUGH, PLANO, SPHERO AND CYLINDER PRISMS

(CONTINUED)

CENTEX

Per Dozen Pairs	SQUARE 42 mm	
	Standard	Rimless
Plano (Both sides ground and polished)		
0.50 to 3.50△	$3.75	$4.25
4.00 to 7.00△	4.25	4.75
8.00 to 10.00△	5.00	5.50
11.00 to 13.00△	6.00	
14.00 to 16.00△	9.00	
17.00 to 20.00△	13.50	
Sphero Prisms		
0.50 to 3.50△		
0.12 to 2.00 S	5.00	5.50
2.25 to 4.25 S	6.00	6.50
Cylinder Prisms		
0.50 to 3.50△		
0.12 to 2.00 C	7.50	8.00
2.25 to 4.25 C	9.00	9.50

PRICES FOR EUPHOS LENSES

(47 mm ROUND)

CENTEX

Per Pair		Uncut	Edged	Edged and Drilled
Periscopic				
0.12 to 2.00	+ or −	$0.75	$1.00	$1.25
2.25 to 4.25	+ or −	.85	1.10	1.35
4.50 to 6.00	+ or −	1.00	1.25	1.50
6.50 to 8.00	+ or −	1.25	1.50	1.75
Meniscus				
6.00 Curve				
0.12 to 2.00	+ or −	1.50	1.75	2.00
2.25 to 4.25	+ or −	1.75	2.00	2.25
4.50 to 6.00	+ or −	2.00	2.25	2.50
6.50 to 8.00	+ or −	2.25	2.50	2.75
Flat Rough Cylinder				
0.12 to 2.00	+ or −, 2 to 4 mm thick	1.25		
2.25 to 4.25	+ or −, 2 to 4 mm thick	1.50		
4.50 to 6.00	+ or −, 2 to 4 mm thick	1.75		
6.50 to 8.00	+ or −, 2 to 4 mm thick	2.00		
Flat Plano and Sphero-Cylinder				
0.12 to 2.00	+ or −	1.50	1.75	2.00
2.25 to 4.25	+ or −	1.75	2.00	2.25
4.50 to 6.00	+ or −	2.00	2.25	2.50
6.50 to 8.00	+ or −	2.25	2.50	2.75
Toric Rough Cylinder				
6.00 Curve				
0.12 to 2.00	+ or −, 2 to 4 mm thick	1.75		
2.25 to 4.25	+ or −, 2 to 4 mm thick	2.00		
4.50 to 6.00	+ or −, 2 to 4 mm thick	2.25		
6.50 to 8.00	+ or −, 2 to 4 mm thick	2.50		
Toric Plano and Sphero-Cylinder				
0.12 to 2.00	+ or −	2.50	2.75	3.00
2.25 to 4.25	+ or −	2.75	3.00	3.25
4.50 to 6.00	+ or −	3.00	3.35	3.60
6.50 to 8.00	+ or −	3.25	3.60	3.85

EXTRA FOR PRISMS

Periscopic and Meniscus, $0.75 per pair.
Flat and Toric Cylinder and Sphero-Cylinder, $0.75 per pair.

PRICES FOR CROOKES LENSES

(47 mm ROUND)

CENTEX

Per Pair	Uncut	Edged	Edged and Drilled
Periscopic			
0.12 to 2.00 + or −	$1.00	$1.25	$1.50
2.25 to 4.25 + or −	1.10	1.35	1.60
4.50 to 6.00 + or −	1.25	1.50	1.75
6.50 to 8.00 + or −	1.50	1.75	2.00
Meniscus 6.00 Curve			
0.12 to 2.00 + or −	2.00	2.25	2.50
2.25 to 4.25 + or −	2.25	2.50	2.75
4.50 to 6.00 + or −	2.50	2.75	3.00
6.50 to 8.00 + or −	2.75	3.00	3.25
Flat Rough Cylinder			
0.12 to 2.00 + or −, 2 to 4 mm thick	1.50		
2.25 to 4.25 + or −, 2 to 4 mm thick	1.75		
4.50 to 6.00 + or −, 2 to 4 mm thick	2.00		
6.50 to 8.00 + or −, 2 to 4 mm thick	2.25		
Flat Plano and Sphero-Cylinder			
0.12 to 2.00 + or −	2.00	2.25	2.50
2.25 to 4.25 + or −	2.25	2.50	2.75
4.50 to 6.00 + or −	2.50	2.75	3.00
6.50 to 8.00 + or −	2.75	3.00	3.25
Toric Rough Cylinder			
0.12 to 2.00 + or −, 2 to 4 mm thick	2.50		
2.25 to 4.25 + or −, 2 to 4 mm thick	2.85		
4.50 to 6.00 + or −, 2 to 4 mm thick	3.20		
6.50 to 8.00 + or −, 2 to 4 mm thick	3.55		
Toric Plano and Sphero-Cylinder			
0.12 to 2.00 + or −	3.00	3.25	3.50
2.25 to 4.25 + or −	3.35	3.60	3.85
4.50 to 6.00 + or −	3.70	4.05	4.30
6.50 to 8.00 + or −	4.05	4.40	4.65

EXTRA FOR PRISMS

Periscopic and Meniscus, $1.00 per pair.
Flat and Toric Cylinder and Sphero-Cylinder, $1.00 per pair.

PRICES FOR NOVIOL LENSES

(47 mm ROUND)

CENTEX

Per Pair	Uncut	Edged	Edged and Drilled
Periscopic			
0.12 to 2.00 + or −	$3.00	$3.50	$3.90
2.25 to 4.25 + or −	3.10	3.60	4.00
4.50 to 6.00 + or −	3.25	3.75	4.15
6.50 to 8.00 + or −	3.50	4.00	4.40
Meniscus 6.00 Curve			
0.12 to 2.00 + or −	3.00	3.50	3.90
2.25 to 4.25 + or −	3.10	3.60	4.00
4.50 to 6.00 + or −	3.25	3.75	4.15
6.50 to 8.00 + or −	3.50	4.00	4.40
Flat Rough Cylinder			
0.12 to 2.00 + or −, 2 to 4 mm thick	3.50		
2.25 to 4.25 + or −, 2 to 4 mm thick	3.75		
4.50 to 6.00 + or −, 2 to 4 mm thick	4.00		
6.50 to 8.00 + or −, 2 to 4 mm thick	4.25		
Flat Plano and Sphero-Cylinder			
0.12 to 2.00 + or −	4.00	4.75	5.15
2.25 to 4.25 + or −	4.25	5.00	5.40
4.50 to 6.00 + or −	4.50	5.25	5.65
6.50 to 8.00 + or −	4.75	5.50	5.90
Toric Rough Cylinder			
0.12 to 2.00 + or −, 2 to 4 mm thick	3.50		
2.25 to 4.25 + or −, 2 to 4 mm thick	3.75		
4.50 to 6.00 + or −, 2 to 4 mm thick	4.00		
6.50 to 8.00 + or −, 2 to 4 mm thick	4.25		
Toric Plano and Sphero-Cylinder			
0.12 to 2.00 + or −	4.00	4.75	5.15
2.25 to 4.25 + or −	4.25	5.00	5.40
4.50 to 6.00 + or −	4.50	5.25	5.65
6.50 to 8.00 + or −	4.75	5.50	5.90

EXTRA FOR PRISMS

Periscopic and Meniscus, $1.50 per pair.
Flat and Toric Cylinder and Sphero-Cylinder, $1.50 per pair.

PRICES FOR AUTO GOGGLE LENSES

CENTEX

These lenses are cut from ground and polished Plano Meniscus 6.00 Curve lenses and are edged to shape illustrated above, or any similar shape.

White lenses are supplied regularly of our Crown Glass.

Roentgen and focused colored lenses are made to order only.

Per Dozen Pairs	Cut from 63 mm Round		Cut from 71 mm Round	
	Edged	Edged and Drilled, 6 Holes to the Pair	Edged	Edged and Drilled, 6 Holes to the Pair
White	$12.75	$14.25	$15.00	$16.50
Smoke	16.50	18.00	18.75	20.25
Amber	20.25	22.50	24.50	26.75
Amethyst	23.00	25.25	27.75	30.00
Ficuzal	23.00	25.25	27.75	30.00

PRICES FOR UNCUT LENSES

MENISCUS, CYLINDER AND SPHERO-CYLINDER

PRIMEX

(47 mm ROUND)

Umbral are colored focused lenses, which we supply in Smoke, Amber and Euphos only.

Smoke is supplied in four shades, having absorptions of 25% (A), 50% (B), 65% (C), and 80% (D), respectively, while Amber is supplied in two shades, light (A) and dark (B), and Euphos in one shade (A) only.

Umbral Meniscus Rough are supplied with either the + or − 6.00 D curve side finished.

Prices for edging Primex lenses are listed on page 74.

White	Per Pair	Umbral	Per Pair
Meniscus		**Meniscus Rough**	
0.12 to 2.00 + or −	$1.25	4 to 5 mm thick	$3.00
2.25 to 4.25 + or −	1.50	**Meniscus**	
4.50 to 6.00 + or −	1.75	0.25 to 2.00 + or −	3.00
6.50 to 8.00 + or −	2.25	2.25 to 4.25 + or −	3.00
Toric Plano-Cylinder		4.50 to 6.00 + or −	3.00
0.12 to 2.00 + or −	1.50	6.50 to 8.00 + or −	3.00
2.25 to 4.25 + or −	1.75	**Toric Plano-Cylinder**	
4.50 to 6.00 + or −	2.25	0.25 to 2.00 C + or −	3.75
6.50 to 8.00 + or −	2.75	2.25 to 4.25 C + or −	3.75
Toric Sphero-Cylinder		**Toric Sphero-Cylinder**	
+ ⌓ +, − ⌓ −, + ⌓ − or − ⌓ +		+ ⌓ +, − ⌓ −, + ⌓ − or − ⌓ +	
0.12 to 2.00 S, 0.12 to 2.00 C	1.75	0.12 to 2.00 S, 0.25 to 2.00 C	4.50
4.25 to 4.25 S, 0.12 to 2.00 C	2.00	2.25 to 4.25 S, 0.25 to 2.00 C	4.50
2.50 to 6.00 S, 0.12 to 2.00 C	2.25	4.50 to 6.00 S, 0.25 to 2.00 C	4.50
0.12 to 6.00 S, 2.25 to 4.25 C	2.00	0.12 to 2.00 S, 2.25 to 4.25 C	4.50
2.25 to 4.25 S, 2.25 to 4.25 C	2.25	2.25 to 4.25 S, 2.25 to 4.25 C	4.50
4.50 to 6.00 S, 2.25 to 4.25 C	2.75	4.50 to 6.00 S, 2.25 to 4.25 C	4.50

PRICES FOR BEVEL AND RIMLESS EDGING

MENISCUS, CYLINDER AND SPHERO-CYLINDER LENSES

PRIMEX

These lenses are centered for each size of eye (center indicated) and are gauged to fit about a 1¾ millimeter strap.

(To be added to prices of White Lenses)

Per Pair	I	0	00	000	000½	0000	Jumbo	DRILLING		
								2 Holes	3 Holes	4 Holes
Meniscus 6.00 Curve 0.12 to 8.00 + or −	$0.15	$0.15	$0.20	$0.25	$0.25	$0.30	$0.30	$0.05	$0.10	$0.15
Toric Plano-Cylinder										
0.12 to 8.00 + or − Axes 90° and 180°	.20	.20	.25	.30	.30	.35	.35	.05	.10	.15
0.12 to 8.00 + or − Other Axes	.25	.25	.30	.35	.35	.40	.40	.05	.10	.15
Toric Sphero-Cylinder + ⌓ +, − ⌓ −, + ⌓ − or − ⌓ +										
0.12 to 6.00 S ⌓ 0.12 to 2.00 C	.20	.20	.25	.30	.30	.35	.35	.05	.10	.15
0.12 to 6.00 S ⌓ 2.25 to 4.25 C	.25	.25	.30	.35	.35	.40	.40	.05	.10	.15

(To be added to prices of Umbral Lenses)

Per Pair	EDGING				DRILLING
	0.12 to 2.00	2.25 to 4.25	4.50 to 6.00	6.50 to 8.00	
Meniscus	$0.50	$0.50	$0.50	$0.50	$0.40
Flat Cylinder and Sphero-Cylinder	.50	.50	.50	.50	.40
Toric Cylinder and Sphero-Cylinder	.75	.75	.75	.75	.40

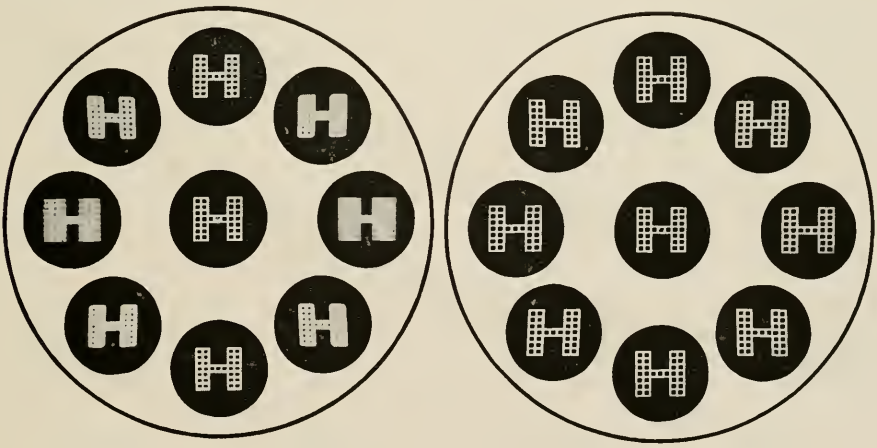
Above prices refer to lenses of all shapes shown in illustrations on pages 86 to 91.

PUNKTAL LENSES

Corrected for astigmatism in *all powers* throughout an angular field of view of 60°, Punktal lenses represent the greatest achievement yet attained in ophthalmic optics and one of the most notable contributions to general optics since the introduction of the photographic anastigmat. They are the outcome of much research on the part of optical scientists and producers, who have long recognized the importance of obtaining lenses corrected to permit as accurate and distinct vision through the margin as through the center but have hitherto failed to solve the problems involved.

The word "Punktal" is of German origin, meaning in this application a lens which reproduces any given definite point of an object as a distinct point in the image—in other words, a lens which gives equally clear definition at all points of its field.

The value of such an optical property is easily apparent when it is considered that the eye in normal vision does not remain stationary in its socket but can be rotated through an angle of nearly 180°. Heretofore it has been impossible with glasses to utilize anything like a natural field satisfactorily, as no lens would give a field of more than 15° around its axis without some astigmatism of oblique pencils.



A B

Fig. 1

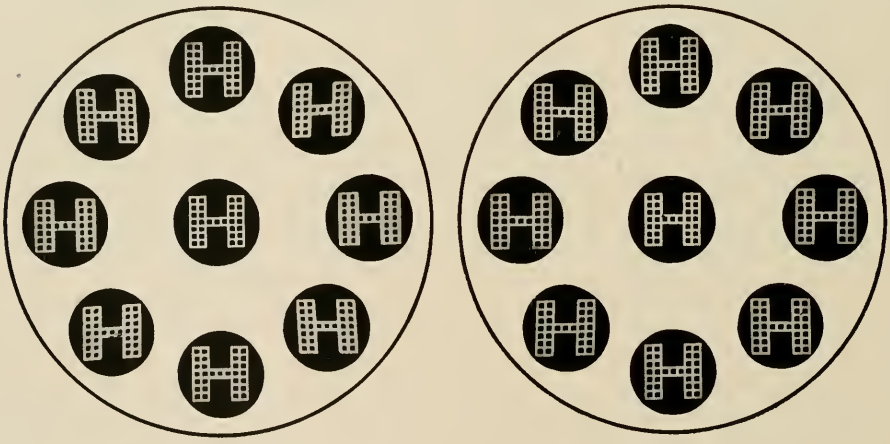
To eliminate this unnatural restriction was the problem of the scientists, until at length Dr. Moritz von Rohr, of the scientific staff of Carl Zeiss, our associates at Jena, Germany, arrived at a practical solution after extensive investigations and published his findings in 1911. He recognized the impossibility of eliminating all astigmatism when using a common base curve for

all powers, or when employing any base curve system, but accomplished his purpose by *computing separately the curves required to correct each power.*

The result is the Punktal lens, which widens the field of astigmatic correction to 60° in *all powers.* The advantage of this is especially obvious when one takes into consideration the large eye sizes of lenses so much in vogue at the present time. It is eminently desirable that as much of this larger lens surface as possible be corrected to give clear vision, in order to insure greatest satisfaction to the customer.

The accompanying illustrations demonstrate the superiority of Punktal lenses more strikingly than any extended description. Figure 1 represents the opposite extremes of optical correction, showing a rectilinear target photographed first through different parts of an ordinary sphero-cylindrical lens of + 3.00 sph. combined with + 2.00 D cyl. (A), and then similarly through a Punktal lens of like powers (B).

The vertical row of targets in each illustration represents the images obtained when the eye is rotated within the plane containing the axis of the cylinder; the horizontal row, when the eye is rotated at right angles to the axis of the cylinder; and the diagonal rows, when the eye is rotated at 45° to the axis of the cylinder. The length of each row measures on the lens an angle of 60°, bisected by the central line of sight. The central image is, of course, satisfactory through either lens. Through the ordinary lens the astigmatism is very pronounced outside the plane containing the axis of the cylinder, while through the Punktal lens all images are equally sharp.



A B

FIG. 2

While Fig. 1 represents, perhaps, the more significant comparison, because of the fact that the majority of lenses worn are still of the flat type,

we show in Fig. 2 a like comparison resulting from photographs of the same target taken through an ordinary 6.00 D base Toric lens of + 4.00 D combined with + 2.00 D and through a Punktal lens of the same radii. While the comparison in this case is, of course, not so marked, yet quite a difference can be noted between the horizontal and vertical lines of the H's near the margin of the ordinary Toric lens—astigmatism—while all of the images in the field of the Punktal lens are of equal quality with that in the center.

That such results cannot be obtained with any system employing a restricted number of different base curves, each common to several powers, is very evident, as is the impracticability of carrying a stock of rough lenses and the tools for each of the different base curves which would be required. At best such a system, according to the indisputable laws of optics, can only be an approximation of the ideal afforded by the Punktal series of finished lenses.

These new lenses are made only in the deep curved forms; they are just as simple in application as the ordinary types and do not require any large investment. They have been patented in the astigmatic corrections and the name "Punktal" registered as a trade mark in the United States. Detailed information as to the principles involved can be obtained from U. S. Patent No. 989,645, issued to Dr. von Rohr, of the Carl Zeiss Works. In instigating the preliminary investigations and meeting the problems of practical manufacture, we have co-operated with the Carl Zeiss Works, and our relationship with them gives us the exclusive manufacturing rights for the American continent.

We furnish Punktal lenses with both sides finished, as the cost of workmanship of the grade required and the multitude of necessary tools render it unprofitable to grind the second side on a small scale. The product comes within the range of precise optics, since, in addition to the astigmatic correction, they offer a higher degree of accuracy in focus and centering than the best of the lenses previously on the market. Hence, as a guarantee of their genuineness and of the uniformly high quality of their workmanship, we engrave a minute reproduction of our trade mark on one of the surfaces, near the margin of each lens. This trade mark is too faint to interfere with vision or to be detected clearly without the aid of a magnifier.

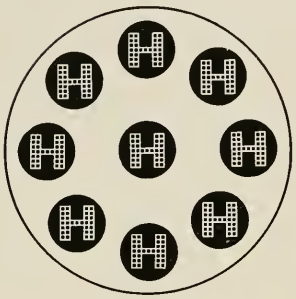
For more extended details regarding Punktal lenses we refer to Pamphlets Nos. 5 and 6, of our Scientific and Technical Publications. The former treats of "Punktal Lenses, Their Advantages and Application to Present Day Methods," while the subject of the latter is "The Significance of Punktal Lens Principles in Application to the Eye." (See page 147.)

PRICES FOR PUNKTAL LENSES

SPHERO, CYLINDER AND SPHERO-CYLINDER

(47 mm ROUND)

WHITE



OBJECT TARGET

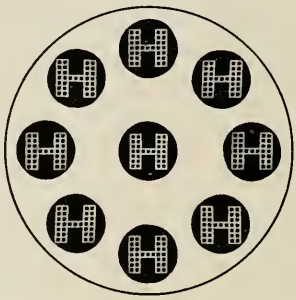


IMAGE AS SEEN THROUGH LENS

These lenses are made and sold under U. S. Patent No. 989,645 to Carl Zeiss, Jena, and under the trade name "Punktal" (Registered U. S. Patent Office No. 93,577, Sept. 23, 1913).

Per Pair	Uncut	Edged	Edged and Drilled			Minimum Retail Prices
			2 Holes	3 Holes	4 Holes	
Meniscus						Net, Per Pair
0.12 to 2.00	$2.00	$2.35	$2.55	$2.65	$2.75	$5.00
2.25 to 4.25 +	2.25	2.60	2.80	2.90	3.00	5.00
4.50 to 7.50	2.50	2.85	3.05	3.15	3.25	5.00
0.12 to 2.00	2.00	2.35	2.55	2.65	2.75	5.00
2.25 to 4.25	2.25	2.60	2.80	2.90	3.00	5.00
4.50 to 8.00 −	2.50	2.85	3.05	3.15	3.25	5.00
8.50 to 13.00	2.75	3.10	3.30	3.40	3.50	7.50
14.00 to 20.00	3.00	3.35	3.55	3.65	3.75	7.50
Toric Plano-Cylinder						
0.12 to 2.00	3.00	3.50	3.80	3.95	4.10	7.50
2.25 to 4.00 + or −	3.75	4.25	4.55	4.70	4.85	7.50
Toric Sphero-Cylinder						
+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ +						
0.12 to 2.00 S 2.25 to 4.25 S 4.50 to 7.50 S } 0.12 to 2.00 C	3.00	3.50	3.80	3.95	4.10	7.50
0.12 to 2.00 S 2.25 to 4.25 S 4.50 to 7.50 S } 2.25 to 4.00 C	3.75	4.25	4.55	4.70	4.85	7.50
0.12 to 2.00 S 2.25 to 4.25 S 4.50 to 7.50 S } Over 4.00 C	4.50	5.00	5.30	5.45	5.60	7.50

EXTRA FOR PRISMS

Sphero, $1.00 per pair; Cylinder, $2.00 per pair.

PRICES FOR PUNKTAL LENSES

SPHERO, CYLINDER AND SPHERO-CYLINDER

UMBRAL, CROOKES AND NOVIOL

(47 mm ROUND)

These lenses are made and sold under U. S. Patent No. 989,645 to Carl Zeiss, Jena, and under the trade name "Punktal" (Registered U. S. Patent Office No. 93,577, Sept. 23, 1913).

Umbral are colored focused lenses, which we supply in Smoke, Amber and Euphos only.

Smoke is supplied in four shades, having absorptions of 25% (A), 50% (B), 65% (C) and 80% (D), respectively, while Amber is supplied in two shades, light (A) and dark (B), and Euphos in one shade (A) only.

Per Pair	Uncut	Edged	Edged and Drilled		
			2 Holes	3 Holes	4 Holes
Meniscus					
0.12 to 2.00 2.25 to 4.25 4.50 to 7.50 +	$5.00	$5.50	$5.90	$5.90	$5.90
0.12 to 2.00	5.00	5.50	6.00	6.00	6.00
2.25 to 4.25	5.50	6.00	6.50	6.50	6.50
4.50 to 8.00 −	6.00	6.75	7.25	7.25	7.25
8.50 to 13.00	6.75	7.50	8.00	8.00	8.00
14.00 to 20.00	7.50	8.25	8.75	8.75	8.75
Toric Plano-Cylinder					
0.12 to 2.00 2.25 to 4.00 + or −	6.00	6.75	7.15	7.15	7.15
Toric Sphero-Cylinder					
+ ⊂ + or − ⊂ −					
0.12 to 2.00 S 2.25 to 4.25 S 4.50 to 7.50 S } 0.12 to 2.00 C	7.50	8.25	8.65	8.65	8.65
0.12 to 2.00 S 2.25 to 4.25 S 4.50 to 7.50 S } 2.25 to 4.00 C	9.00	9.75	10.15	10.15	10.15
0.12 to 2.00 S 2.25 to 4.25 S 4.50 to 7.50 S } Over 4.00 C	10.50	11.25	12.00	12.00	12.00

EXTRA FOR PRISMS

Sphero, $1.00 per pair; Cylinder, $1.00 per pair.

Punktal are also supplied in any of our other regular colors at the above prices.

KATRAL LENSES

Persons successfully operated on for cataract may, in a certain sense, become endowed with a better power of vision than one having normal sight, due to the fact that a cataract lens, in combination with the optical system of an eye divested of its crystalline lens, produces a larger image on the retina than does the optical system of a normal eye. This slight advantage, however, has hitherto been more than offset by serious defects, in that the ordinary (double convex) cataract lenses supplied for such cases only afforded a very narrow field of view through their centers. Consequently, a patient must constantly turn his head in the desired direction or obtain badly distorted images.

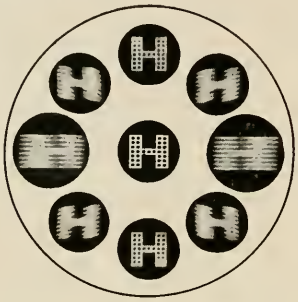


Image Through Ordinary Cataract Lens

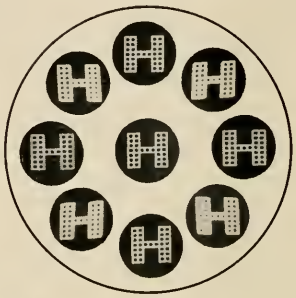


Image Through Katral Lens

The new series of Katral lenses have removed this uncomfortable handicap by providing a field of 60° as well corrected throughout as that of the Punktal lenses just described, permitting the patient to rotate his eyes naturally and obtain as accurate vision through the margins as through the centers. This superiority is strikingly shown by the accompanying illustrations.

To obtain these results it is necessary to make one of the lens surfaces non-spherical, a difficult process accounting largely for the unavoidably higher price. Katral lenses are also made of a special optical glass, requiring careful treatment, but do not differ noticeably in appearance, size or weight from a meniscus lens. They are supplied in powers ranging from + 8.00 D_V to + 20.00 D_V. As a rule they are made for a reading distance of 25 cm (10 inches), and to restrict their weight are generally not allowed to exceed 39 mm in diameter.

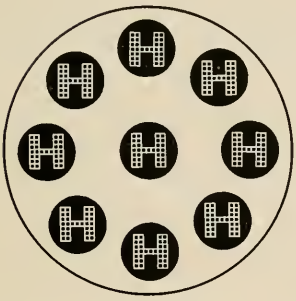
To insure greatest satisfaction to the patient, Katral lenses require very accurate adjustment. In cases of astigmatism arising after an operation none but round or drop oval lenses should be prescribed; otherwise it would be impossible to adapt them accurately. Furthermore, round and drop oval lenses give the patient quite an extension of the lower portion of his field of view.

To insure perfect satisfaction complete data must be given by the refractionist. We provide a printed form, shown on page 48, which should be followed in full.

PRICES FOR KATRAL LENSES

SPHERO AND TORIC SPHERO-CYLINDER

(39 mm ROUND)



OBJECT TARGET

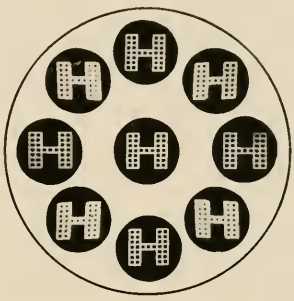


IMAGE AS SEEN THROUGH LENS

Per Lens	Uncut	Edged	Edged and Drilled		
			2 Holes	3 Holes	4 Holes
Sphero	Per Lens	Per Lens	Per Lens	Per Lens	Per Lens
8.00 to 15.00 +	$20.00	$21.00	$21.50	$22.00	$22.50
Over 15.00 +	25.00	26.00	26.50	27.00	27.50
Toric Sphero-Cylinder					
+ ⌒ + 8.00 to 15.00 S ⌒ 0.50 to 4.00 C	20.00	21.00	21.50	22.00	22.50
+ ⌒ + 8.00 to 15.00 S ⌒ Over 4.00 C	25.00	26.00	26.50	27.00	27.50

PRICES FOR MISCELLANEOUS LENSES

UNCUT

PORTEX

Per Dozen Pairs	Stan.	Rim.
Double		
Oval 44 x 34 mm		
0.12 to 2.00 +	$0.75	$0.85
2.25 to 4.25 +	.85	.95
4.50 to 6.00 +	1.00	1.10
6.50 to 8.00 +	1.25	1.35
Periscopic		
Oval 45 x 35.5 mm		
1.25 Curve		
0.12 to 2.00 +	.90	1.00
2.25 to 4.25 +	1.00	1.10
4.50 to 6.00 +	1.25	1.35
6.50 to 8.00 +	1.50	1.60

Per Dozen Pairs	Stan.	Rim.
Double		
Round 42 mm		
0.12 to 2.00 +	$0.90	$1.05
2.25 to 4.25 +	1.00	1.15
4.50 to 6.00 +	1.25	1.40
6.50 to 8.00 +	1.50	1.65
Plano Flat White		
Oval 44 x 34 mm	.60	.70
Round 42 mm	.75	.85
Plano Flat Smoke		
Oval 44 x 34 mm	.85	1.05
Round 42 mm	1.10	1.30

COQUILLE AND MI-COQUILLE GLASSES

UNCUT

Coquille and Mi-Coquille glasses are supplied in First Quality only.
They are blown and cut from ball.
If wanted with ground and polished surfaces, refer to prices of Plano 1.25 and 6.00 Curve on pages 54 and 55.

Per Dozen Pairs	44 x 33 mm	50 x 40 mm	60 x 50 mm	70 x 60 mm
Coquille				
White	$1.00	$1.50	$2.00	$3.00
Smoke and Blue	1.25	2.00	2.75	4.00
Amber	1.50	2.50	3.50	5.00
Mi-Coquille				
White	.75	1.00	1.50	2.00
Smoke and Blue	1.00	1.50	2.25	3.00
Amber	1.25	2.00	3.00	4.00

EXTRA

Add 25% to above prices for Coquille and Mi-Coquille Smoke and Blue, when ordered in shades darker than D.

EDGING AND DRILLING

CENTEX AND PORTEX

In the preceding pages we have listed uncut lenses in the regular order which we have followed for many years, but attention is here directed to a departure from former practice in the listing of edged lenses. Heretofore it has been customary to list edged lenses at the prices of finished lenses. In this catalog, however, we have adopted the system of listing the uncut lenses and the prices for edging and drilling separately.

The price of a finished lens, white or colored and of any size or shape, can readily be found, therefore, by taking the price of the uncut in the size required, according to the chart on page 85, and adding the separate prices for edging and drilling and such extras as may apply, noted on page 110. For lenses not listed a special price will be quoted.

This system is applied only to our Centex and Portex series. For all lenses listed by the pair, or singly, we have found it convenient to give both the prices for uncut and for edging and drilling in the same section of the catalog, generally on the same page. These lenses include the Primex, Punktal, Katral, Euphos, Crookes, Noviol, Kryptok and Ultex Onepiece Bifocals.

TABLE OF STANDARD SIZES OF EDGED LENSES

BEVEL EDGE

		Eye Sizes in mm							
		2	1	0	00	000	000½	0000	Jumbo
Round	A	30.8	32.4	33.7	35.6	36.8	38.3	40.2	41.5
Full Oval	B	34x27	35.5x28.5	36.8x29.8	38.7x31.7	39.8x32.8	41.5x34.5	43.5x36.5	44.9x37.9
Regular Oval	C	35x26	36.5x27.5	37.8x28.8	39.7x30.7	41x32	42.5x33.5	44.5x35.5	45.4x37.4
Long Oval	D	35.5x25.5	37x27	38.3x28.3	40.2x30.2	41.5x31.5	43x33	45x35	46.9x36.9
Short Oval	E	33.5x27.5	35x29	36.3x30.3	38.2x32.2	39.5x33.5	41x35	43x37	44.4x38.4
German No. 9	G	.....	37x27						
German No. 11	G	.....	.....	38.9x28.9					
German No. 13	G	.....	.....	.....	40.6x30.6				
Australian No. 2	G	35x26							
Australian No. 3	G	.....	36.7x27.7						
Australian No. 4	G	.....	.....	38.4x29.4					
Australian No. 5	G	.....	.....	.....	39.6x30.6				
Australian No. 10	G	.....	36.7x27.7						
Australian No. 12	G	.....	.....	38.4x29.4					
Clerical Shape	H	34x22.5	35x20.7	36x21	39.5x22.5	38.5x24.7			
Clerical Shape	I	37x14	36.4x14.5	37.7x15.1	39.5x16	41x17			

RIMLESS EDGE

		Eye Sizes in mm							
		2	1	0	00	000	000½	0000	Jumbo
Round	Ar	36	37	38.5	40	41	42.5	44.5	45.4
Full Oval	Br	36x29	37x30	38.5x31.5	40x33	41x34	41.5x34.5	43.5x36.5	45.4x38.4
Regular Oval	Cr	36x27	37 x28	38.5x29.5	40x31	41x32	42.5x33.5	44.5x35.5	45.4x37.4
Long Oval	Dr	36x26	37x27	38.5x28.5	40x30	41x31	.....	44.5x34.5	45.4x35.4
Short Oval	Er	34.5x28.5	35.5x29.5	37x31	38.5x32.5	39.5x33.5	41x35	43x37	44.4x38.4
Drop Oval	Fr	33.7x27.2	35.2x28.7	36.5x30	38.4x31.9	39.7x33.2	41.2x34.7	43.2x36.7	44.1x38.6

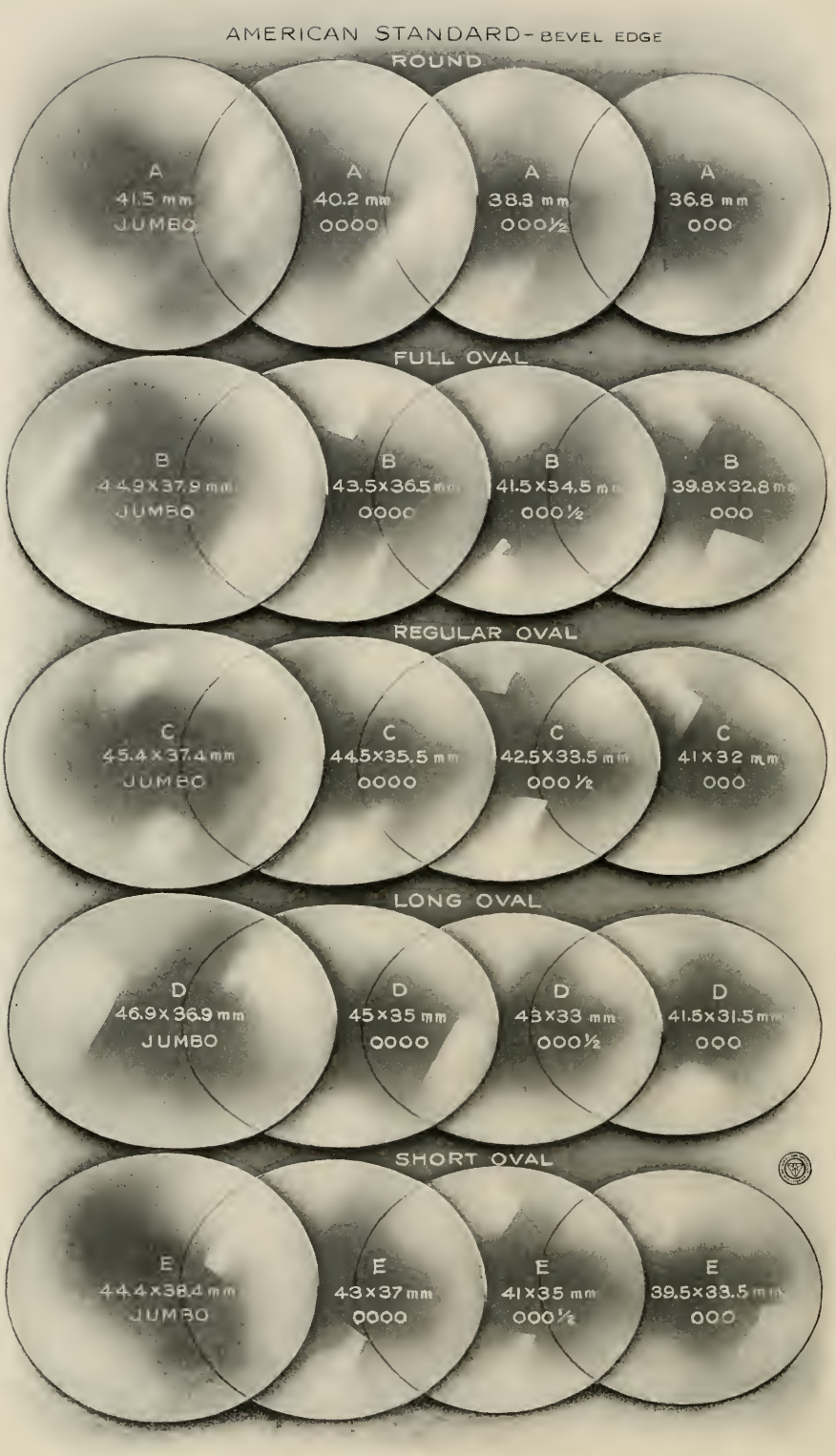
CHART OF UNCUT SIZES FOR EDGING

This chart shows the sizes of Uncut Lenses to be used for various sizes of Edged Lenses, based on the following allowance for decentration.

0.12 to 0.37 . . . . .6.0 mm	1.37 to 2.00 . . . . 2.00 mm
0.50 to 0.87 . . . . .4.0 mm	2.12 to 3.00 . . . . 1.5 mm
1.00 to 1.25 . . . . .2.5 mm	3.25 up . . . . . 0.75 mm

To find the size of uncut lenses required for a certain size of edged lens, trace down the "width of oval" column, then across to the desired length of oval; the figure in the intersecting space will indicate the size of uncut that will cut to the best advantage and will form the basis of prices for lenses edged to size.

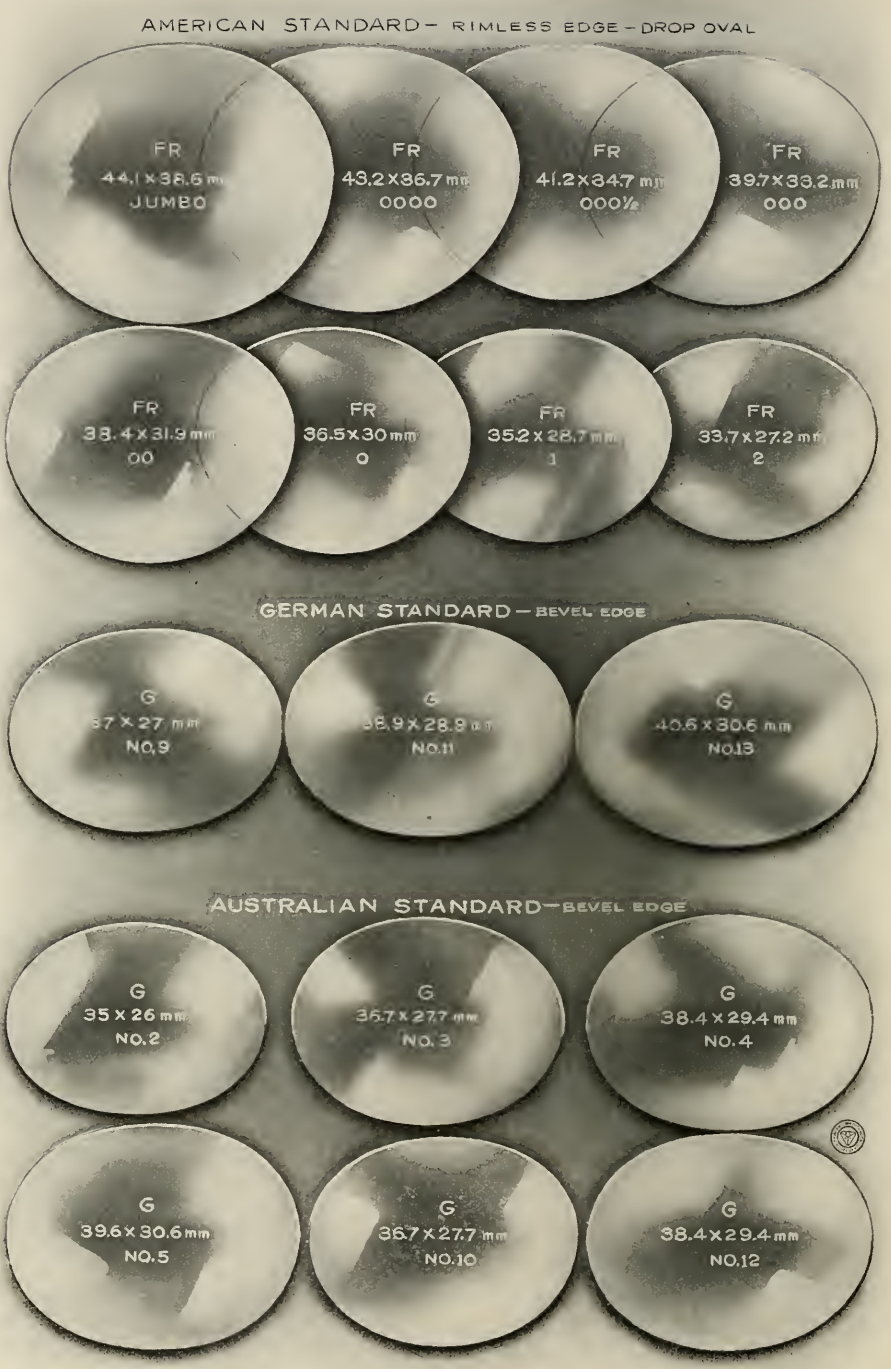
Width of Oval in mm	Length of Oval in mm																
	37.5	38	38.5	39	39.5	40	40.5	41	41.5	42	42.5	43	43.5	44	44.5	45	45.5
26.													47	47	47	47	47
26.5													47	47	47	47	47
27.													47	47	47	47	47
27.5													47	47	47	47	47
28.													47	47	47	47	47
28.5						All Sizes Within the Heavy Line							47	47	47	47	47
29.						Will Cut from Regular Oval							47	47	47	47	47
29.5													47	47	47	47	47
30.													47	47	47	47	47
30.5													47	47	47	47	47
31.													47	47	47	47	47
31.5													47	47	47	47	47
32.											47	47	47	47	47	47	47
32.5											47	47	47	47	47	47	47
33.	..	42	42	42	42	42	47	47	47	47	47	47	47	47	47	47	47
33.5	..	..	42	42	42	42	47	47	47	47	47	47	47	47	47	47	47
34.	..	..	..	42	42	42	47	47	47	47	47	47	47	47	47	47	47
34.5	..	..	..	..	42	42	47	47	47	47	47	47	47	47	47	47	47
35.	..	..	..	..	..	42	47	47	47	47	47	47	47	47	47	47	47
35.5	..	..	..	..	..	42	47	47	47	47	47	47	47	47	47	47	47
36.	..	..	..	..	..	42	47	47	47	47	47	47	47	47	47	47	47
36.5	..	..	..	..	..	42	47	47	47	47	47	47	47	47	47	47	47
37.	..	..	..	..	..	42	47	47	47	47	47	47	47	47	47	47	47
37.5	..	..	..	..	..	42	47	47	47	47	47	47	47	47	47	47	47
38.	..	..	..	..	..	42	47	47	47	47	47	47	47	47	47	47	47
38.5	..	..	..	..	..	42	47	47	47	47	47	47	47	47	47	47	47
39.	..	..	..	..	..	..	..	..	..	..	..	..	..	47	47	47	47

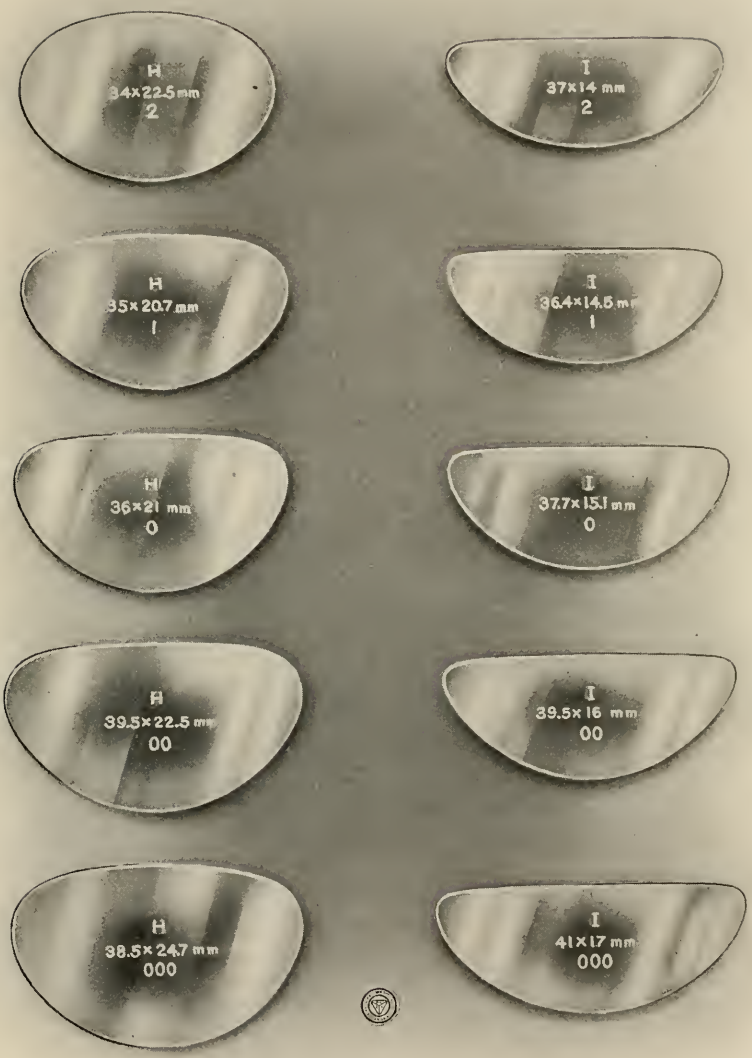

AMERICAN STANDARD - BEVEL EDGE
ROUND
A 41.5 mm JUMBO
A 40.2 mm 0000
A 38.3 mm 000½
A 36.8 mm 000
FULL OVAL
B 44.9 X 37.9 mm JUMBO
B 43.5 X 36.5 mm 0000
B 41.5 X 34.5 mm 000½
B 39.8 X 32.8 mm 000
REGULAR OVAL
C 45.4 X 37.4 mm JUMBO
C 44.5 X 35.5 mm 0000
C 42.5 X 33.5 mm 000½
C 41 X 32 mm 000
LONG OVAL
D 46.9 X 36.9 mm JUMBO
D 45 X 35 mm 0000
D 43 X 33 mm 000½
D 41.5 X 31.5 mm 000
SHORT OVAL
E 44.4 X 38.4 mm JUMBO
E 43 X 37 mm 0000
E 41 X 35 mm 000½
E 39.5 X 33.5 mm 000

AMERICAN STANDARD – BEVEL EDGE
ROUND
A
35.6 mm
00
A
33.7 mm
0
A
32.4 mm
1
A
30.8 mm
2
FULL OVAL
B
38.7 x 31.7 mm
00
B
36.8 x 29.8 mm
0
B
35.5 x 28.5 mm
1
B
34 x 27 mm
2
REGULAR OVAL
C
39.7 x 30.7
00
C
37.8 x 28.8 mm
0
C
36.5 x 27.5 mm
1
C
35 x 26 mm
2
LONG OVAL
D
40.2 x 30.2 mm
00
D
38.3 x 28.8 mm
0
D
37 x 27 mm
1
D
35.5 x 25.5 mm
2
SHORT OVAL
E
38.2 x 32.2 mm
00
E
36.3 x 30.3 mm
0
E
35 x 29 mm
1
E
33.5 x 27.5 mm
2

AMERICAN STANDARD – RIMLESS EDGE
ROUND
AR 45.4 mm JUMBO
AR 44.5 mm 0000
AR 42.5 mm 000½
AR 41 mm 000
FULL OVAL
BR 45.4 x 38.4 mm JUMBO
BR 43.5 x 36.5 mm 0000
BR 41.5 x 34.5 mm 000½
BR 41 x 34 mm 000
REGULAR OVAL
CR 45.4 x 37.4 mm JUMBO
CR 44.5 x 35.5 mm 0000
CR 42.5 x 33.5 mm 000½
CR 41 x 32 mm 000
LONG OVAL
DR 45.4 x 35.4 mm JUMBO
DR 44.5 x 34.5 mm 0000
DR 41 x 31 mm 000
SHORT OVAL
ER 44.4 x 38.4 mm JUMBO
ER 43 x 37 mm 0000
ER 41 x 35 mm 000½
ER 39.5 x 33.5 mm 000

AMERICAN STANDARD – RIMLESS EDGE
ROUND
AR 40 mm 00
AR 38.5 mm 0
AR 37 mm 1
AR 36 mm 2
FULL OVAL
BR 40 x 33 mm 00
BR 38.5 x 31.5 mm 0
BR 37 x 30 mm 1
BR 36 x 29 mm 2
REGULAR OVAL
CR 40 x 31 mm 00
CR 38.5 x 29.5 mm 0
CR 37 x 28 mm 1
CR 36 x 27 mm 2
LONG OVAL
DR 40 x 30 mm 00
DR 38.5 x 28.5 mm 0
DR 37 x 27 mm 1
DR 36 x 26 mm 2
SHORT OVAL
ER 38.5 x 32.5 mm 00
ER 37 x 31 mm 0
ER 35.5 x 29.5 mm 1
ER 34.5 x 28.5 mm 2


AMERICAN STANDARD – RIMLESS EDGE – DROP OVAL
FR
44.1 x 38.6 mm
JUMBO
FR
43.2 x 36.7 mm
0000
FR
41.2 x 34.7 mm
000½
FR
39.7 x 33.2 mm
000
FR
38.4 x 31.9 mm
00
FR
36.5 x 30 mm
0
FR
35.2 x 28.7 mm
1
FR
33.7 x 27.2 mm
2
GERMAN STANDARD – BEVEL EDGE
G
37 x 27 mm
NO.9
G
38.9 x 28.9 mm
NO.11
G
40.6 x 30.6 mm
NO.13
AUSTRALIAN STANDARD – BEVEL EDGE
G
35 x 26 mm
NO.2
G
36.7 x 27.7 mm
NO.3
G
38.4 x 29.4 mm
NO.4
G
39.6 x 30.6 mm
NO.5
G
36.7 x 27.7 mm
NO.10
G
38.4 x 29.4 mm
NO.12


H
34x22.5 mm
2
I
37x14 mm
2
H
35x20.7 mm
1
I
36.4x14.5 mm
1
H
36x21 mm
0
I
37.7x15.1 mm
0
H
39.5x22.5 mm
00
I
39.5x16 mm
00
H
38.5x24.7 mm
000
I
41x17 mm
000

PRICES FOR BEVEL AND RIMLESS EDGING

PLANO AND SPHERO

ROUND

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size of eye, other than standard, figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		WHITE						
		1	0	00	000	000½	0000	Jumbo
Plano								
Flat		$0.70	$0.80	$1.00	$1.30	$1.80	$1.80	$2.30
1.25 Curve		.70	.80	1.00	1.30	1.80	1.80	2.30
6.00 Curve		1.50	1.80	2.30	2.80	3.30	3.30	3.80
9.00 Curve		2.30	2.60	3.10	3.60	4.10	4.10	4.60
Sphero								
0.12 to 2.00	Plano, Double and Periscopic +	.70	.80	1.00	1.30	1.80	1.80	2.30
2.25 to 4.25		.75	.85	1.05	1.35	1.85	1.85	2.35
4.50 to 6.00		.80	.90	1.10	1.40	1.90	1.90	2.40
6.50 to 8.00		.85	.95	1.15	1.45	1.95	1.95	2.45
8.50 to 10.00		1.80	2.00	2.30	2.80			
10.50 to 13.00		2.30	2.50	2.80	3.30			
14.00 to 16.00		2.80	3.00	3.30	3.80			
18.00 to 20.00		2.80	3.00	3.30	3.80			
0.12 to 2.00	Plano, Double and Periscopic −	.70	.80	1.00	1.30	1.80	1.80	2.30
2.25 to 4.25		.75	.85	1.05	1.35	1.85	1.85	2.35
4.50 to 6.00		.80	.90	1.10	1.40	1.90	1.90	2.40
6.50 to 8.00		.85	.95	1.15	1.45	1.95	1.95	2.45
8.50 to 10.00		2.30	2.50	2.80	3.30			
10.50 to 13.00		3.30	3.50	3.80	4.30			
14.00 to 16.00		4.30	4.50	4.80	5.30			
18.00 to 20.00		4.30	4.50	4.80	5.30			
Meniscus − 6.00 Base Curve								
0.12 to 2.00	+	1.10	1.30	1.80	2.30	2.80	2.80	3.30
2.25 to 4.25		1.20	1.40	1.90	2.40	2.90	2.90	3.40
4.50 to 6.00		1.30	1.50	2.00	2.50	3.00	3.00	3.50
6.50 to 8.00		1.40	1.60	2.10	2.60	3.10	3.10	3.60
Meniscus + 6.00 Base Curve								
0.12 to 2.00	−	1.50	1.80	2.30	2.80	3.30	3.30	3.80
2.25 to 4.25		1.60	1.90	2.40	2.90	3.40	3.40	3.90
4.50 to 6.00		1.70	2.00	2.50	3.00	3.50	3.50	4.00
6.50 to 8.00		1.80	2.10	2.60	3.10	3.60	3.60	4.10

PRICES FOR BEVEL AND RIMLESS EDGING

PLANO AND SPHERO

ROUND

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size of eye, other than standard, figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs	COLORED						
	1	0	00	000	000½	0000	Jumbo
Plano							
Flat	$0.80	$0.90	$1.20	$1.50	$2.00	$2.00	$2.50
1.25 Curve	.80	.90	1.20	1.50	2.00	2.00	2.50
6.00 Curve	1.80	2.10	2.80	3.30	3.80	3.80	4.30
9.00 Curve	2.80	3.10	4.10	4.60	5.10	5.10	5.60
Sphero							
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 — Plano, Double and Periscopic +	.80	.90	1.20	1.50	2.00	2.00	2.50
	.85	.95	1.25	1.55	2.05	2.05	2.55
	.90	1.00	1.30	1.60	2.10	2.10	2.60
	.95	1.05	1.35	1.65	2.15	2.15	2.65
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 — Plano, Double and Periscopic −	.80	.90	1.20	1.50	2.00	2.00	2.50
	.85	.95	1.25	1.55	2.05	2.05	2.55
	.90	1.00	1.30	1.60	2.10	2.10	2.60
	.95	1.05	1.35	1.65	2.15	2.15	2.65
Meniscus — 6.00 Base Curve							
0.12 to 2.00	1.30	1.50	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25	1.40	1.60	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00	1.50	1.70	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00	1.60	1.80	2.50	3.00	3.50	3.50	4.00
Meniscus + 6.00 Base Curve							
0.12 to 2.00	1.80	2.10	2.80	3.30	3.80	3.80	4.30
2.25 to 4.25	1.90	2.20	2.90	3.40	3.90	3.90	4.40
4.50 to 6.00	2.00	2.30	3.00	3.50	4.00	4.00	4.50
6.50 to 8.00	2.10	2.40	3.10	3.60	4.10	4.10	4.60

PRICES FOR BEVEL AND RIMLESS EDGING

PLANO AND SPHERO

REGULAR OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		WHITE						
		1	0	00	000	000½	0000	Jumbo
Plano								
Flat		$0.40	$0.50	$0.70	$1.00	$1.50	$1.50	$2.00
1.25 Curve		.40	.50	.70	1.00	1.50	1.50	2.00
6.00 Curve		1.20	1.50	2.00	2.50	3.00	3.00	3.50
9.00 Curve		2.00	2.30	2.80	3.30	3.80	3.80	4.30
Sphero								
0.12 to 2.00	Plano, Double and Periscopic +	.40	.50	.70	1.00	1.50	1.50	2.00
2.25 to 4.25		.45	.55	.75	1.05	1.55	1.55	2.05
4.50 to 6.00		.50	.60	.80	1.10	1.60	1.60	2.10
6.50 to 8.00		.55	.65	.85	1.15	1.65	1.65	2.15
8.50 to 10.00		1.50	1.70	2.00	2.50			
10.50 to 13.00		2.00	2.20	2.50	3.00			
14.00 to 16.00		2.50	2.70	3.00	3.50			
18.00 to 20.00		2.50	2.70	3.00	3.50			
0.12 to 2.00	Plano, Double and Periscopic −	.40	.50	.70	1.00	1.50	1.50	2.00
2.25 to 4.25		.45	.55	.75	1.05	1.55	1.55	2.05
4.50 to 6.00		.50	.60	.80	1.10	1.60	1.60	2.10
6.50 to 8.00		.55	.65	.85	1.15	1.65	1.65	2.15
8.50 to 10.00		2.00	2.20	2.50	3.00			
10.50 to 13.00		3.00	3.20	3.50	4.00			
14.00 to 16.00		4.00	4.20	4.50	5.00			
18.00 to 20.00		4.00	4.20	4.50	5.00			
Meniscus — 6.00 Base Curve								
0.12 to 2.00	+	.80	1.00	1.50	2.00	2.50	2.50	3.00
2.25 to 4.25		.90	1.10	1.60	2.10	2.60	2.60	3.10
4.50 to 6.00		1.00	1.20	1.70	2.20	2.70	2.70	3.20
6.50 to 8.00		1.10	1.30	1.80	2.30	2.80	2.80	3.30
Meniscus + 6.00 Base Curve								
0.12 to 2.00	−	1.20	1.50	2.00	2.50	3.00	3.00	3.50
2.25 to 4.25		1.30	1.60	2.10	2.60	3.10	3.10	3.60
4.50 to 6.00		1.40	1.70	2.20	2.70	3.20	3.20	3.70
6.50 to 8.00		1.50	1.80	2.30	2.80	3.30	3.30	3.80
Coquille		.30	.30	.30	.50	1.00	1.00	1.50
Mi-Coquille		.20	.20	.30	.50	1.00	1.00	1.50

PRICES FOR BEVEL AND RIMLESS EDGING

PLANO AND SPHERO

REGULAR OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs	COLORED						
	1	0	00	000	000½	0000	Jumbo
Plano							
Flat	$0.50	$0.60	$0.90	$1.20	$1.70	$1.70	$2.20
1.25 Curve	.50	.60	.90	1.20	1.70	1.70	2.20
6.00 Curve	1.50	1.80	2.50	3.00	3.50	3.50	4.00
9.00 Curve	2.50	2.80	3.80	4.30	4.80	4.80	5.30
Sphero							
0.12 to 2.00 Plano, 2.25 to 4.25 Double and 4.50 to 6.00 Periscopic 6.50 to 8.00 +	.50	.60	.90	1.20	1.70	1.70	2.20
	.55	.65	.95	1.25	1.75	1.75	2.25
	.60	.70	1.00	1.30	1.80	1.80	2.30
	.65	.75	1.05	1.35	1.85	1.85	2.35
0.12 to 2.00 Plano, 2.25 to 4.25 Double and 4.50 to 6.00 Periscopic 6.50 to 8.00 −	.50	.60	.90	1.20	1.70	1.70	2.20
	.55	.65	.95	1.25	1.75	1.75	2.25
	.60	.70	1.00	1.30	1.80	1.80	2.30
	.65	.75	1.05	1.35	1.85	1.85	2.35
Meniscus — 6.00 Base Curve							
0.12 to 2.00	1.00	1.20	1.90	2.40	2.90	2.90	3.40
2.25 to 4.25 +	1.10	1.30	2.00	2.50	3.00	3.00	3.50
4.50 to 6.00 +	1.20	1.40	2.10	2.60	3.10	3.10	3.60
6.50 to 8.00 +	1.30	1.50	2.20	2.70	3.20	3.20	3.70
Meniscus + 6.00 Base Curve							
0.12 to 2.00	1.50	1.80	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25 −	1.60	1.90	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00 −	1.70	2.00	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00 −	1.80	2.10	2.80	3.30	3.80	3.80	4.30
Coquille	.30	.30	.30	.50	1.00	1.00	1.50
Mi-Coquille	.20	.20	.30	.50	1.00	1.00	1.50

PRICES FOR BEVEL AND RIMLESS EDGING

PLANO AND SPHERO

FULL AND SHORT OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		WHITE						
		1	0	00	000	000½	0000	Jumbo
Plano								
Flat		$0.65	$0.75	$0.95	$1.25	$1.75	$1.75	$2.25
1.25 Curve		.65	.75	.95	1.25	1.75	1.75	2.25
6.00 Curve		1.45	1.75	2.25	2.75	3.25	3.25	3.75
9.00 Curve		2.25	2.55	3.05	3.55	4.05	4.05	4.55
Sphero								
0.12 to 2.00	Plano, Double and Periscopic +	.65	.75	.95	1.25	1.75	1.75	2.25
2.25 to 4.25		.70	.80	1.00	1.30	1.80	1.80	2.30
4.50 to 6.00		.75	.85	1.05	1.35	1.85	1.85	2.35
6.50 to 8.00		.80	.90	1.10	1.40	1.90	1.90	2.40
8.50 to 10.00		1.75	1.95	2.25	2.75			
10.50 to 13.00		2.25	2.45	2.75	3.25			
14.00 to 16.00		2.75	2.95	3.25	3.75			
18.00 to 20.00		2.75	2.95	3.25	3.75			
0.12 to 2.00	Plano, Double and Periscopic −	.65	.75	.95	1.25	1.75	1.75	2.25
2.25 to 4.25		.70	.80	1.00	1.30	1.80	1.80	2.30
4.50 to 6.00		.75	.85	1.05	1.35	1.85	1.85	2.35
6.50 to 8.00		.80	.90	1.10	1.40	1.90	1.90	2.40
8.50 to 10.00		2.25	2.45	2.75	3.25			
10.50 to 13.00		3.25	3.45	3.75	4.25			
14.00 to 16.00		4.25	4.45	4.75	5.25			
18.00 to 20.00		4.25	4.45	4.75	5.25			
Meniscus — 6.00 Base Curve								
0.12 to 2.00	+	1.05	1.25	1.75	2.25	2.75	2.75	3.25
2.25 to 4.25		1.15	1.35	1.85	2.35	2.85	2.85	3.35
4.50 to 6.00		1.25	1.45	1.95	2.45	2.95	2.95	3.45
6.50 to 8.00		1.35	1.55	2.05	2.55	3.05	3.05	3.55
Meniscus + 6.00 Base Curve								
0.12 to 2.00	−	1.45	1.75	2.25	2.75	3.25	3.25	3.75
2.25 to 4.25		1.55	1.85	2.35	2.85	3.35	3.35	3.85
4.50 to 6.00		1.65	1.95	2.45	2.95	3.45	3.45	3.95
6.50 to 8.00		1.75	2.05	2.55	3.05	3.55	3.55	4.05

PRICES FOR BEVEL AND RIMLESS EDGING

PLANO AND SPHERO

FULL AND SHORT OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs	COLORED						
	1	0	00	000	000½	0000	Jumbo
Plano							
Flat	$0.75	$0.85	$1.15	$1.45	$1.95	$1.95	$2.45
1.25 Curve	.75	.85	1.15	1.45	1.95	1.95	2.45
6.00 Curve	1.75	2.05	2.75	3.25	3.75	3.75	4.25
9.00 Curve	2.75	3.05	4.05	4.55	5.05	5.05	5.55
Sphero							
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 — Plano, Double and Periscopic +	.75 / .80 / .85 / .90	.85 / .90 / .95 / 1.00	1.15 / 1.20 / 1.25 / 1.30	1.45 / 1.50 / 1.55 / 1.60	1.95 / 2.00 / 2.05 / 2.10	1.95 / 2.00 / 2.05 / 2.10	2.45 / 2.50 / 2.55 / 2.60
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 — Plano, Double and Periscopic −	.75 / .80 / .85 / .90	.85 / .90 / .95 / 1.00	1.15 / 1.20 / 1.25 / 1.30	1.45 / 1.50 / 1.55 / 1.60	1.95 / 2.00 / 2.05 / 2.10	1.95 / 2.00 / 2.05 / 2.10	2.45 / 2.50 / 2.55 / 2.60
Meniscus — 6.00 Base Curve							
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 +	1.25 / 1.35 / 1.45 / 1.55	1.45 / 1.55 / 1.65 / 1.75	2.15 / 2.25 / 2.35 / 2.45	2.65 / 2.75 / 2.85 / 2.95	3.15 / 3.25 / 3.35 / 3.45	3.15 / 3.25 / 3.35 / 3.45	3.65 / 3.75 / 3.85 / 3.95
Meniscus + 6.00 Base Curve							
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 −	1.75 / 1.85 / 1.95 / 2.05	2.05 / 2.15 / 2.25 / 2.35	2.75 / 2.85 / 2.95 / 3.05	3.25 / 3.35 / 3.45 / 3.55	3.75 / 3.85 / 3.95 / 4.05	3.75 / 3.85 / 3.95 / 4.05	4.25 / 4.35 / 4.45 / 4.55

PRICES FOR BEVEL AND RIMLESS EDGING

PLANO AND SPHERO

DROP OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		WHITE						
		1	0	00	000	000½	0000	Jumbo
Plano								
Flat		$0.90	$1.00	$1.20	$1.50	$2.00	$2.00	$2.50
1.25 Curve		.90	1.00	1.20	1.50	2.00	2.00	2.50
6.00 Curve		1.70	2.00	2.50	3.00	3.50	3.50	4.00
9.00 Curve		2.50	2.80	3.30	3.80	4.30	4.30	4.80
Sphero								
0.12 to 2.00	Plano, Double and Periscopic +	.90	1.00	1.20	1.50	2.00	2.00	2.50
2.25 to 4.25		.95	1.05	1.25	1.55	2.05	2.05	2.55
4.50 to 6.00		1.00	1.10	1.30	1.60	2.10	2.10	2.60
6.50 to 8.00		1.05	1.15	1.35	1.65	2.15	2.15	2.65
8.50 to 10.00		2.00	2.20	2.50	3.00			
10.50 to 13.00		2.50	2.70	3.00	3.50			
14.00 to 16.00		3.00	3.20	3.50	4.00			
18.00 to 20.00		3.00	3.20	3.50	4.00			
0.12 to 2.00	Plano, Double and Periscopic −	.90	1.00	1.20	1.50	2.00	2.00	2.50
2.25 to 4.25		.95	1.05	1.25	1.55	2.05	2.05	2.55
4.50 to 6.00		1.00	1.10	1.30	1.60	2.10	2.10	2.60
6.50 to 8.00		1.05	1.15	1.35	1.65	2.15	2.15	2.65
8.50 to 10.00		2.50	2.70	3.00	3.50			
10.50 to 13.00		3.50	3.70	4.00	4.50			
14.00 to 16.00		4.50	4.70	5.00	5.50			
18.00 to 20.00		4.50	4.70	5.00	5.50			
Meniscus — 6.00 Base Curve								
0.12 to 2.00	+	1.30	1.50	2.00	2.50	3.00	3.00	3.50
2.25 to 4.25		1.40	1.60	2.10	2.60	3.10	3.10	3.60
4.50 to 6.00		1.50	1.70	2.20	2.70	3.20	3.20	3.70
6.50 to 8.00		1.60	1.80	2.30	2.80	3.30	3.30	3.80
Meniscus + 6.00 Base Curve								
0.12 to 2.00	−	1.70	2.00	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		1.80	2.10	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		1.90	2.20	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.00	2.30	2.80	3.30	3.80	3.80	4.30

PRICES FOR BEVEL AND RIMLESS EDGING

PLANO AND SPHERO

DROP OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs	COLORED						
	1	0	00	000	000½	0000	Jumbo
Plano							
Flat	$1.00	$1.10	$1.40	$1.70	$2.20	$2.20	$2.70
1.25 Curve	1.00	1.10	1.40	1.70	2.20	2.20	2.70
6.00 Curve	2.00	2.30	3.00	3.50	4.00	4.00	4.50
9.00 Curve	3.00	3.30	4.30	4.80	5.30	5.30	5.80
Sphero							
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 — Plano, Double and Periscopic +	1.00 / 1.05 / 1.10 / 1.15	1.10 / 1.15 / 1.20 / 1.25	1.40 / 1.45 / 1.50 / 1.55	1.70 / 1.75 / 1.80 / 1.85	2.20 / 2.25 / 2.30 / 2.35	2.20 / 2.25 / 2.30 / 2.35	2.70 / 2.75 / 2.80 / 2.85
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 — Plano, Double and Periscopic −	1.00 / 1.05 / 1.10 / 1.15	1.10 / 1.15 / 1.20 / 1.25	1.40 / 1.45 / 1.50 / 1.55	1.70 / 1.75 / 1.80 / 1.85	2.20 / 2.25 / 2.30 / 2.35	2.20 / 2.25 / 2.30 / 2.35	2.70 / 2.75 / 2.80 / 2.85
Meniscus — 6.00 Base Curve							
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 +	1.50 / 1.60 / 1.70 / 1.80	1.70 / 1.80 / 1.90 / 2.00	2.40 / 2.50 / 2.60 / 2.70	2.90 / 3.00 / 3.10 / 3.20	3.40 / 3.50 / 3.60 / 3.70	3.40 / 3.50 / 3.60 / 3.70	3.90 / 4.00 / 4.10 / 4.20
Meniscus + 6.00 Base Curve							
0.12 to 2.00 / 2.25 to 4.25 / 4.50 to 6.00 / 6.50 to 8.00 −	2.00 / 2.10 / 2.20 / 2.30	2.30 / 2.40 / 2.50 / 2.60	3.00 / 3.10 / 3.20 / 3.30	3.50 / 3.60 / 3.70 / 3.80	4.00 / 4.10 / 4.20 / 4.30	4.00 / 4.10 / 4.20 / 4.30	4.50 / 4.60 / 4.70 / 4.80

PRICES FOR BEVEL AND RIMLESS EDGING

CYLINDER, FLAT AND TORIC

ROUND

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size of eye, other than standard, figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		WHITE						
		1	0	00	000	000½	0000	Jumbo
Plano-Cylinder								
Flat								
0.12 to 2.00	+ or − Axes 90° and 180°	$1.30	$1.50	$1.80	$2.30	$2.80	$2.80	$3.30
2.25 to 4.25		1.40	1.60	1.90	2.40	2.90	2.90	3.40
4.50 to 6.00		1.50	1.70	2.00	2.50	3.00	3.00	3.50
6.50 to 8.00		1.60	1.80	2.10	2.60	3.10	3.10	3.60
0.12 to 2.00	+ or − Other Axes	1.50	1.70	2.00	2.50	3.00	3.00	3.50
2.25 to 4.25		1.60	1.80	2.10	2.60	3.10	3.10	3.60
4.50 to 6.00		1.70	1.90	2.20	2.70	3.20	3.20	3.70
6.50 to 8.00		1.80	2.00	2.30	2.80	3.30	3.30	3.80
Sphero-Cylinder								
Flat								
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Axes 90° and 180°	1.80	2.00	2.30	2.80	3.30	3.30	3.80
2.25 to 4.25		1.90	2.10	2.40	2.90	3.40	3.40	3.90
4.50 to 6.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
6.50 to 8.00		2.10	2.30	2.60	3.10	3.60	3.60	4.10
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Other Axes	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30
Plano-Cylinder								
Toric								
0.12 to 2.00	+ or − Axes 90° and 180°	1.80	2.00	2.30	2.80	3.30	3.30	3.80
2.25 to 4.25		1.90	2.10	2.40	2.90	3.40	3.40	3.90
4.50 to 6.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
6.50 to 8.00		2.10	2.30	2.60	3.10	3.60	3.60	4.10
0.12 to 2.00	+ or − Other Axes	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30
Sphero-Cylinder								
Toric								
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Axes 90° and 180°	1.80	2.00	2.30	2.80	3.30	3.30	3.80
2.25 to 4.25		1.90	2.10	2.40	2.90	3.40	3.40	3.90
4.50 to 6.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
6.50 to 8.00		2.10	2.30	2.60	3.10	3.60	3.60	4.10
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Other Axes	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30

PRICES FOR BEVEL AND RIMLESS EDGING

CYLINDER, FLAT AND TORIC

ROUND

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size of eye, other than standard, figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		COLORED						
		1	0	00	000	000½	0000	Jumbo
Plano-Cylinder								
Flat								
0.12 to 2.00	+ or − Axes 90° and 180°	$1.50	$1.70	$2.00	$2.50	$3.00	$3.00	$3.50
2.25 to 4.25		1.60	1.80	2.10	2.60	3.10	3.10	3.60
4.50 to 6.00		1.70	1.90	2.20	2.70	3.20	3.20	3.70
6.50 to 8.00		1.80	2.00	2.30	2.80	3.30	3.30	3.80
0.12 to 2.00	+ or − Other Axes	1.70	1.90	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
Sphero-Cylinder								
Flat								
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Axes 90° and 180°	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Other Axes	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50
Plano-Cylinder								
Toric								
0.12 to 2.00	+ or − Axes 90° and 180°	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30
0.12 to 2.00	+ or − Other Axes	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50
Sphero-Cylinder								
Toric								
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Axes 90° and 180°	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Other Axes	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50

PRICES FOR BEVEL AND RIMLESS EDGING

CYLINDER, FLAT AND TORIC

REGULAR OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		WHITE						
		1	0	00	000	000½	0000	Jumbo
Plano-Cylinder								
Flat								
0.12 to 2.00	+ or − Axes 90° and 180°	$1.00	$1.20	$1.50	$2.00	$2.50	$2.50	$3.00
2.25 to 4.25		1.10	1.30	1.60	2.10	2.60	2.60	3.10
4.50 to 6.00		1.20	1.40	1.70	2.20	2.70	2.70	3.20
6.50 to 8.00		1.30	1.50	1.80	2.30	2.80	2.80	3.30
0.12 to 2.00	+ or − Other Axes	1.20	1.40	1.70	2.20	2.70	2.70	3.20
2.25 to 4.25		1.30	1.50	1.80	2.30	2.80	2.80	3.30
4.50 to 6.00		1.40	1.60	1.90	2.40	2.90	2.90	3.40
6.50 to 8.00		1.50	1.70	2.00	2.50	3.00	3.00	3.50
Sphero-Cylinder								
Flat								
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Axes 90° and 180°	1.50	1.70	2.00	2.50	3.00	3.00	3.50
2.25 to 4.25		1.60	1.80	2.10	2.60	3.10	3.10	3.60
4.50 to 6.00		1.70	1.90	2.20	2.70	3.20	3.20	3.70
6.50 to 8.00		1.80	2.00	2.30	2.80	3.30	3.30	3.80
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Other Axes	1.70	1.90	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
Plano-Cylinder								
Toric								
0.12 to 2.00	+ or − Axes 90° and 180°	1.50	1.70	2.00	2.50	3.00	3.00	3.50
2.25 to 4.25		1.60	1.80	2.10	2.60	3.10	3.10	3.60
4.50 to 6.00		1.70	1.90	2.20	2.70	3.20	3.20	3.70
6.50 to 8.00		1.80	2.00	2.30	2.80	3.30	3.30	3.80
0.12 to 2.00	+ or − Other Axes	1.70	1.90	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
Sphero-Cylinder								
Toric								
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Axes 90° and 180°	1.50	1.70	2.00	2.50	3.00	3.00	3.50
2.25 to 4.25		1.60	1.80	2.10	2.60	3.10	3.10	3.60
4.50 to 6.00		1.70	1.90	2.20	2.70	3.20	3.20	3.70
6.50 to 8.00		1.80	2.00	2.30	2.80	3.30	3.30	3.80
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Other Axes	1.70	1.90	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00

PRICES FOR BEVEL AND RIMLESS EDGING

CYLINDER, FLAT AND TORIC

REGULAR OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		COLORED						
		1	0	00	000	000½	0000	Jumbo
Plano-Cylinder								
Flat								
0.12 to 2.00	+ or − Axes 90° and 180°	$1.20	$1.40	$1.70	$2.20	$2.70	$2.70	$3.20
2.25 to 4.25		1.30	1.50	1.80	2.30	2.80	2.80	3.30
4.50 to 6.00		1.40	1.60	1.90	2.40	2.90	2.90	3.40
6.50 to 8.00		1.50	1.70	2.00	2.50	3.00	3.00	3.50
0.12 to 2.00	+ or − Other Axes	1.40	1.60	1.90	2.40	2.90	2.90	3.40
2.25 to 4.25		1.50	1.70	2.00	2.50	3.00	3.00	3.50
4.50 to 6.00		1.60	1.80	2.10	2.60	3.10	3.10	3.60
6.50 to 8.00		1.70	1.90	2.20	2.70	3.20	3.20	3.70
Sphero-Cylinder								
Flat								
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Axes 90° and 180°	1.70	1.90	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Other Axes	1.90	2.10	2.40	2.90	3.40	3.40	3.90
2.25 to 4.25		2.00	2.20	2.50	3.00	3.50	3.50	4.00
4.50 to 6.00		2.10	2.30	2.60	3.10	3.60	3.60	4.10
6.50 to 8.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
Plano-Cylinder								
Toric								
0.12 to 2.00	+ or − Axes 90° and 180°	1.70	1.90	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
0.12 to 2.00	+ or − Other Axes	1.90	2.10	2.40	2.90	3.40	3.40	3.90
2.25 to 4.25		2.00	2.20	2.50	3.00	3.50	3.50	4.00
4.50 to 6.00		2.10	2.30	2.60	3.10	3.60	3.60	4.10
6.50 to 8.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
Sphero-Cylinder								
Toric								
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Axes 90° and 180°	1.70	1.90	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
0.12 to 2.00	+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Other Axes	1.90	2.10	2.40	2.90	3.40	3.40	3.90
2.25 to 4.25		2.00	2.20	2.50	3.00	3.50	3.50	4.00
4.50 to 6.00		2.10	2.30	2.60	3.10	3.60	3.60	4.10
6.50 to 8.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20

PRICES FOR BEVEL AND RIMLESS EDGING

CYLINDER, FLAT AND TORIC

FULL AND SHORT OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		WHITE						
		1	0	00	000	000½	0000	Jumbo
Plano-Cylinder								
Flat								
0.12 to 2.00	+ or − Axes 90° and 180°	$1.25	$1.45	$1.75	$2.25	$2.75	$2.75	$3.25
2.25 to 4.25		1.35	1.55	1.85	2.35	2.85	2.85	3.35
4.50 to 6.00		1.45	1.65	1.95	2.45	2.95	2.95	3.45
6.50 to 8.00		1.55	1.75	2.05	2.55	3.05	3.05	3.55
0.12 to 2.00	+ or − Other Axes	1.45	1.65	1.95	2.45	2.95	2.95	3.45
2.25 to 4.25		1.55	1.75	2.05	2.55	3.05	3.05	3.55
4.50 to 6.00		1.65	1.85	2.15	2.65	3.15	3.15	3.65
6.50 to 8.00		1.75	1.95	2.25	2.75	3.25	3.25	3.75
Sphero-Cylinder								
Flat								
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Axes 90° and 180°	1.75	1.95	2.25	2.75	3.25	3.25	3.75
2.25 to 4.25		1.85	2.05	2.35	2.85	3.35	3.35	3.85
4.50 to 6.00		1.95	2.15	2.45	2.95	3.45	3.45	3.95
6.50 to 8.00		2.05	2.25	2.55	3.05	3.55	3.55	4.05
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Other Axes	1.95	2.15	2.45	2.95	3.45	3.45	3.95
2.25 to 4.25		2.05	2.25	2.55	3.05	3.55	3.55	4.05
4.50 to 6.00		2.15	2.35	2.65	3.15	3.65	3.65	4.15
6.50 to 8.00		2.25	2.45	2.75	3.25	3.75	3.75	4.25
Plano-Cylinder								
Toric								
0.12 to 2.00	+ or − Axes 90° and 180°	1.75	1.95	2.25	2.75	3.25	3.25	3.75
2.25 to 4.25		1.85	2.05	2.35	2.85	3.35	3.35	3.85
4.50 to 6.00		1.95	2.15	2.45	2.95	3.45	3.45	3.95
6.50 to 8.00		2.05	2.25	2.55	3.05	3.55	3.55	4.05
0.12 to 2.00	+ or − Other Axes	1.95	2.15	2.45	2.95	3.45	3.45	3.95
2.25 to 4.25		2.05	2.25	2.55	3.05	3.55	3.55	4.05
4.50 to 6.00		2.15	2.35	2.65	3.15	3.65	3.65	4.15
6.50 to 8.00		2.25	2.45	2.75	3.25	3.75	3.75	4.25
Sphero-Cylinder								
Toric								
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Axes 90° and 180°	1.75	1.95	2.25	2.75	3.25	3.25	3.75
2.25 to 4.25		1.85	2.05	2.35	2.85	3.35	3.35	3.85
4.50 to 6.00		1.95	2.15	2.45	2.95	3.45	3.45	3.95
6.50 to 8.00		2.05	2.25	2.55	3.05	3.55	3.55	4.05
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Other Axes	1.95	2.15	2.45	2.95	3.45	3.45	3.95
2.25 to 4.25		2.05	2.25	2.55	3.05	3.55	3.55	4.05
4.50 to 6.00		2.15	2.35	2.65	3.15	3.65	3.65	4.15
6.50 to 8.00		2.25	2.45	2.75	3.25	3.75	3.75	4.25

PRICES FOR BEVEL AND RIMLESS EDGING

CYLINDER, FLAT AND TORIC

FULL AND SHORT OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		COLORED						
		1	0	00	000	000½	0000	Jumbo
Plano-Cylinder								
Flat								
0.12 to 2.00	+ or − Axes 90° and 180°	$1.45	$1.65	$1.95	$2.45	$2.95	$2.95	$3.45
2.25 to 4.25		1.55	1.75	2.05	2.55	3.05	3.05	3.55
4.50 to 6.00		1.65	1.85	2.15	2.65	3.15	3.15	3.65
6.50 to 8.00		1.75	1.95	2.25	2.75	3.25	3.25	3.75
0.12 to 2.00	+ or − Other Axes	1.65	1.85	2.15	2.65	3.15	3.15	3.65
2.25 to 4.25		1.75	1.95	2.25	2.75	3.25	3.25	3.75
4.50 to 6.00		1.85	2.05	2.35	2.85	3.35	3.35	3.85
6.50 to 8.00		1.95	2.15	2.45	2.95	3.45	3.45	3.95
Sphero-Cylinder								
Flat								
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Axes 90° and 180°	1.95	2.15	2.45	2.95	3.45	3.45	3.95
2.25 to 4.25		2.05	2.25	2.55	3.05	3.55	3.55	4.05
4.50 to 6.00		2.15	2.35	2.65	3.15	3.65	3.65	4.15
6.50 to 8.00		2.25	2.45	2.75	3.25	3.75	3.75	4.25
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Other Axes	2.15	2.35	2.65	3.15	3.65	3.65	4.15
2.25 to 4.25		2.25	2.45	2.75	3.25	3.75	3.75	4.25
4.50 to 6.00		2.35	2.55	2.85	3.35	3.85	3.85	4.35
6.50 to 8.00		2.45	2.65	2.95	3.45	3.95	3.95	4.45
Plano-Cylinder								
Toric								
0.12 to 2.00	+ or − Axes 90° and 180°	1.95	2.15	2.45	2.95	3.45	3.45	3.95
2.25 to 4.25		2.05	2.25	2.55	3.05	3.55	3.55	4.05
4.50 to 6.00		2.15	2.35	2.65	3.15	3.65	3.65	4.15
6.50 to 8.00		2.25	2.45	2.75	3.25	3.75	3.75	4.25
0.12 to 2.00	+ or − Other Axes	2.15	2.35	2.65	3.15	3.65	3.65	4.15
2.25 to 4.25		2.25	2.45	2.75	3.25	3.75	3.75	4.25
4.50 to 6.00		2.35	2.55	2.85	3.35	3.85	3.85	4.35
6.50 to 8.00		2.45	2.65	2.95	3.45	3.95	3.95	4.45
Sphero-Cylinder								
Toric								
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Axes 90° and 180°	1.95	2.15	2.45	2.95	3.45	3.45	3.95
2.25 to 4.25		2.05	2.25	2.55	3.05	3.55	3.55	4.05
4.50 to 6.00		2.15	2.35	2.65	3.15	3.65	3.65	4.15
6.50 to 8.00		2.25	2.45	2.75	3.25	3.75	3.75	4.25
0.12 to 2.00	+ ⊖ +, − ⊖ −, + ⊖ − or − ⊖ + Other Axes	2.15	2.35	2.65	3.15	3.65	3.65	4.15
2.25 to 4.25		2.25	2.45	2.75	3.25	3.75	3.75	4.25
4.50 to 6.00		2.35	2.55	2.85	3.35	3.85	3.85	4.35
6.50 to 8.00		2.45	2.65	2.95	3.45	3.95	3.95	4.45

PRICES FOR BEVEL AND RIMLESS EDGING

CYLINDER, FLAT AND TORIC

DROP OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		WHITE						
		1	0	00	000	000½	0000	Jumbo
Plano-Cylinder								
Flat								
0.12 to 2.00	+ or − Axes 90° and 180°	$1.50	$1.70	$2.00	$2.50	$3.00	$3.00	$3.50
2.25 to 4.25		1.60	1.80	2.10	2.60	3.10	3.10	3.60
4.50 to 6.00		1.70	1.90	2.20	2.70	3.20	3.20	3.70
6.50 to 8.00		1.80	2.00	2.30	2.80	3.30	3.30	3.80
0.12 to 2.00	+ or − Other Axes	1.70	1.90	2.20	2.70	3.20	3.20	3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
Sphero-Cylinder								
Flat								
0.12 to 2.00	+ ⊂ +, − ⊂ −, + ⊂ − or − ⊂ + Axes 90° and 180°	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30
0.12 to 2.00	+ ⊂ +, − ⊂ −, + ⊂ − or − ⊂ + Other Axes	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50
Plano-Cylinder								
Toric								
0.12 to 2.00	+ or − Axes 90° and 180°	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30
0.12 to 2.00	+ or − Other Axes	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50
Sphero-Cylinder								
Toric								
0.12 to 2.00	+ ⊂ +, − ⊂ −, + ⊂ − or − ⊂ + Axes 90° and 180°	2.00	2.20	2.50	3.00	3.50	3.50	4.00
2.25 to 4.25		2.10	2.30	2.60	3.10	3.60	3.60	4.10
4.50 to 6.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
6.50 to 8.00		2.30	2.50	2.80	3.30	3.80	3.80	4.30
0.12 to 2.00	+ ⊂ +, − ⊂ −, + ⊂ − or − ⊂ + Other Axes	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50

PRICES FOR BEVEL AND RIMLESS EDGING

CYLINDER, FLAT AND TORIC

DROP OVAL

(TO BE ADDED TO UNCUT LENSES)

To obtain prices of finished lenses, add prices given below to price of uncut, taking into account the size of uncut required per chart on page 85, and such extra as may apply, given on page 110.

To determine price for size or shape of eye, other than standard, add length to width and figure 25 cents per dozen pairs extra to the nearest standard eye size.

For the required uncut size, consult chart on page 85.

Prices for Edging not listed, will be given on request.

Per Dozen Pairs		COLORED						
		1	0	00	000	000½	0000	Jumbo
Plano-Cylinder								
Flat								
0.12 to 2.00	+ or − Axes 90° and 180°	$1.70	$1.90	$2.20	$2.70	$3.20	$3.20	$3.70
2.25 to 4.25		1.80	2.00	2.30	2.80	3.30	3.30	3.80
4.50 to 6.00		1.90	2.10	2.40	2.90	3.40	3.40	3.90
6.50 to 8.00		2.00	2.20	2.50	3.00	3.50	3.50	4.00
0.12 to 2.00	+ or − Other Axes	1.90	2.10	2.40	2.90	3.40	3.40	3.90
2.25 to 4.25		2.00	2.20	2.50	3.00	3.50	3.50	4.00
4.50 to 6.00		2.10	2.30	2.60	3.10	3.60	3.60	4.10
6.50 to 8.00		2.20	2.40	2.70	3.20	3.70	3.70	4.20
Sphero-Cylinder								
Flat								
0.12 to 2.00	+ ⌓ +, − ⌓ −, + ⌓ − or − ⌓ + Axes 90° and 180°	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50
0.12 to 2.00	+ ⌓ +, − ⌓ −, + ⌓ − or − ⌓ + Other Axes	2.40	2.60	2.90	3.40	3.90	3.90	4.40
2.25 to 4.25		2.50	2.70	3.00	3.50	4.00	4.00	4.50
4.50 to 6.00		2.60	2.80	3.10	3.60	4.10	4.10	4.60
6.50 to 8.00		2.70	2.90	3.20	3.70	4.20	4.20	4.70
Plano-Cylinder								
Toric								
0.12 to 2.00	+ or − Axes 90° and 180°	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50
0.12 to 2.00	+ or − Other Axes	2.40	2.60	2.90	3.40	3.90	3.90	4.40
2.25 to 4.25		2.50	2.70	3.00	3.50	4.00	4.00	4.50
4.50 to 6.00		2.60	2.80	3.10	3.60	4.10	4.10	4.60
6.50 to 8.00		2.70	2.90	3.20	3.70	4.20	4.20	4.70
Sphero-Cylinder								
Toric								
0.12 to 2.00	+ ⌓ +, − ⌓ −, + ⌓ − or − ⌓ + Axes 90° and 180°	2.20	2.40	2.70	3.20	3.70	3.70	4.20
2.25 to 4.25		2.30	2.50	2.80	3.30	3.80	3.80	4.30
4.50 to 6.00		2.40	2.60	2.90	3.40	3.90	3.90	4.40
6.50 to 8.00		2.50	2.70	3.00	3.50	4.00	4.00	4.50
0.12 to 2.00	+ ⌓ +, − ⌓ −, + ⌓ − or − ⌓ + Other Axes	2.40	2.60	2.90	3.40	3.90	3.90	4.40
2.25 to 4.25		2.50	2.70	3.00	3.50	4.00	4.00	4.50
4.50 to 6.00		2.60	2.80	3.10	3.60	4.10	4.10	4.60
6.50 to 8.00		2.70	2.90	3.20	3.70	4.20	4.20	4.70

PRICES FOR DRILLING WHITE EDGED LENSES

Per Dozen Pairs	HOLES 1	2	3	4
Plano				
Flat	$0.20	$0.30	$0.40	$0.50
1.25 Curve	.20	.30	.40	.50
6.00 Curve	.20	.40	.60	.80
9.00 Curve	.30	.60	.90	1.20
Sphero				
Plano, Double, Periscopic + 0.12 to 8.00	.20	.30	.40	.50
Plano, Double, Periscopic − 0.12 to 8.00	.20	.30	.40	.50
Meniscus — 6.00 Base Curve				
0.12 to 8.00 +	.20	.40	.60	.80
Meniscus + 6.00 Base Curve				
0.12 to 8.00 −	.20	.50	.80	1.00
Coquille	.20	.30	.40	.50
Mi-Coquille	.20	.30	.40	.50
Plano-Cylinder Flat				
+ or − Axes 90° and 180°				
0.12 to 8.00	.20	.40	.60	.80
+ or − Other Axes				
0.12 to 8.00	.20	.40	.60	.80
Sphero-Cylinder Flat				
+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Axes 90° and 180°				
0.12 to 8.00	.20	.40	.60	.80
+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Other Axes				
0.12 to 8.00	.20	.40	.60	.80
Plano-Cylinder Toric				
+ or − Axes 90° and 180°				
0.12 to 8.00	.30	.60	.90	1.20
+ or − Other Axes				
0.12 to 8.00	.30	.60	.90	1.20
Sphero-Cylinder Toric				
+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Axes 90° and 180°				
0.12 to 8.00	.30	.60	.90	1.20
+ ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + Other Axes				
0.12 to 8.00	.30	.60	.90	1.20
Plano Prisms				
0.50 to 3.50△	.20	.40	.60	.80
Sphero-Prisms				
0.50 to 3.50△	.20	.40	.60	.80
Cylinder-Prisms				
0.50 to 3.50△	.20	.40	.60	.80

PRICES FOR DRILLING COLORED EDGED LENSES

Per Dozen Pairs	HOLES 1	2	3	4
Plano				
Flat	$0.30	$0.40	$0.50	$0.60
1.25 Curve	.30	.40	.50	.60
6.00 Curve	.40	.60	.80	1.00
9.00 Curve	.50	.80	1.10	1.40
Sphero				
Plano Double Periscopic } + 0.12 to 8.00	.30	.40	.50	.60
Plano Double Periscopic } − 0.12 to 8.00	.30	.40	.50	.60
Meniscus — 6.00 Base Curve				
0.12 to 8.00 +	.40	.60	.80	1.00
Meniscus + 6.00 Base Curve				
0.12 to 8.00 −	.40	.70	1.00	1.20
Coquille	.20	.30	.40	.50
Mi-Coquille	.20	.30	.40	.50
Plano-Cylinder				
Flat				
+ or − Axes 90° and 180°				
0.12 to 8.00	.40	.60	.80	1.00
+ or − Other Axes				
0.12 to 8.00	.40	.60	.80	1.00
Sphero-Cylinder				
Flat				
+ ⊂ +, − ⊂ −, + ⊂ − or − ⊂ + Axes 90° and 180°				
0.12 to 8.00	.40	.60	.80	1.00
+ ⊂ +, − ⊂ −, + ⊂ − or − ⊂ + Other Axes				
0.12 to 8.00	.40	.60	.80	1.00
Plano-Cylinder				
Toric				
+ or − Axes 90° and 180°				
0.12 to 8.00	.50	.80	1.10	1.40
+ or − Other Axes				
0.12 to 8.00	.50	.80	1.10	1.40
Sphero-Cylinder				
Toric				
+ ⊂ +, − ⊂ −, + ⊂ − or − ⊂ + Axes 90° and 180°				
0.12 to 8.00	.50	.80	1.10	1.40
+ ⊂ +, − ⊂ −, + ⊂ − or − ⊂ + Other Axes				
0.12 to 8.00	.50	.80	1.10	1.40

PRICES FOR BEVEL AND RIMLESS EDGING PRISMS

	38 mm Rd.	38 mm Sq.	1	0	00	000
Plano-Prisms						
0.50 to 3.50△	$2.00	$3.70	$2.00	$2.20	$2.50	$3.50
Sphero-Prisms						
0.50 to 3.50△	2.00	3.70	2.00	2.20	2.50	3.50
Cylinder-Prisms						
0.50 to 3.50△	....	....	3.00	3.20	3.50	4.50

EXTRAS

(ADD TO PRICE OF EDGED LENSES)

No.	Item	Price per Dozen Pairs
1	Polished edges	$0.30
2	Centering Sphero lenses to 1 eye	.20
3	Centering Sphero lenses to 0 eye	.30
4	Centering Sphero lenses to 00 eye	.40
5	Centering Sphero lenses to 000 eye	.50
6	Centering Cement Wafers	3.00
7	Centering Perfection Bifocal Uppers	.50
8	Centering Perfection Bifocal Lowers	.50
9	Centering Perfection Bifocal Lenses	1.00
10	Long oval shape, same price as regular oval	....
11	German Standard No. 9, same price as 1 eye regular oval	....
12	German Standard No. 11, same price as 0 eye regular oval	....
13	German Standard No. 13, same price as 00 eye regular oval	....
14	Australian Standard No. 2, same price as 2 eye regular oval	....
15	Australian Standard No. 3, same price as 1 eye regular oval	....
16	Australian Standard No. 4, same price as 0 eye regular oval	....
17	Australian Standard No. 5, same price as 00 eye regular oval	....
18	Australian Standard No. 10, same price as 1 eye regular oval	....
19	Australian Standard No. 12, same price as 0 eye regular oval	....
20	Clerical Shapes H, add to different sizes of eyes	1.50
21	Clerical Shapes G, add to different sizes of eyes	1.50
22	For special sizes other than listed	.25
23	Edged and Split Cement Wafers, add to ½ price of uncut cement wafers	1.25
24	Plano, Sphero, Plano-Cylinders and Prisms matted for trial cases	.75
25	Prescription Prices will be charged:	
	a: For all lenses not quoted by the dozen	....
	b: For special foci	....
	c: For less than six pairs in a division of focus numbers or plano	....
	d: For lenses not regularly carried in stock, when ordered in small quantities	....

BIFOCAL LENSES

Nearly all of us who require glasses to aid our normal vision find at some time that we need lenses of different strengths for reading and for viewing distant objects. Then we become interested in bifocals—glasses with an upper section for distant vision and a lower section of different strength for reading, or other close eye work.

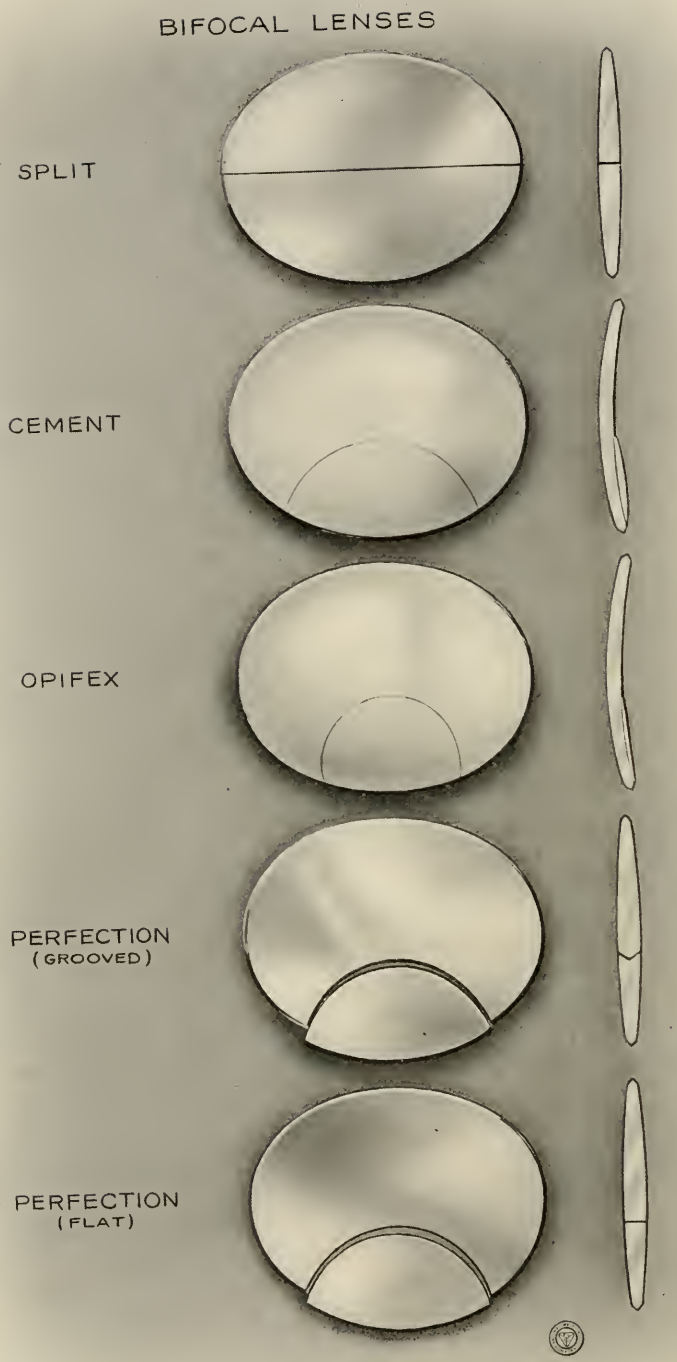
Before the days of Benjamin Franklin people encumbered themselves with two pairs of glasses when their eyes were in this condition, but that practice was naturally a nuisance. Franklin conceived the idea of overcoming this by cutting both pairs of glasses in two and mounting two "distance" halves in the same frame with two "reading" halves. The unique product of the inventor-statesman's ingenuity was to form the foundation for the interesting evolution of a most useful ophthalmic line—bifocal lenses.

This crude beginning was a step in advance in point of convenience but these "split" bifocals, as well as the cemented types developed from them, presented many disadvantages. The lines of separation were unsightly in appearance and annoying to the wearer. Furthermore, dirt was collected in the creases and segments were likely to drop apart in time.

Optical scientists soon perceived then that the ideal bifocal lens must eliminate these marked separation lines and unequal surfaces—in other words, that it must be of one piece of glass or its equivalent. Their early efforts were both imperfect and impracticable. Many difficulties were encountered, and it was only after years of investigation along this line that they were able to devise means of producing such a lens, both optically and commercially practical. Recent results of their endeavor are the Kryptok and the Ultex Onepiece Bifocal lenses, among the highest achievements yet recorded in the chronicle of optical development.

These last two types of bifocal lenses are ample reward for long experimenting, to bring theories within the range of practical usage. Their vast superiority to the earlier forms of bifocals is obvious, since they are solid lenses with no disfiguring lines of separation. They are just as graceful on the face as any ordinary single lenses and as convenient in use. The Ultex Onepiece Bifocals, being made of a single piece of crown glass of our regular refractive index, are also free from chromatic aberration.

The different types of bifocals here mentioned are illustrated and listed separately on the following pages.


BIFOCAL LENSES
SPLIT
CEMENT
OPIFEX
PERFECTION
(GROOVED)
PERFECTION
(FLAT)

SPLIT AND CEMENT BIFOCAL LENSES

Split Bifocal—This lens consists of two half lenses of varying power with the edges, which are in contact, ground flat. These lenses are designed for use in frames only.

Cement Bifocal—In this bifocal a very thin wafer, oval or round in shape and ground to the proper curves, is cemented to a periscopic or other form of lens and permits of a range of reading and distance foci of 0.12 to 8.00 D. The Cement Bifocal is a very popular moderate priced lens.

Perfection Bifocal—A modified form of split bifocal. It consists of two lenses of different foci, accurately fitted together. The lower lens, or reading portion, is in the form of a segment, 25 x 13 mm, while the upper, or distance lens, is shaped as illustrated. These parts are fitted together in two ways: by means of a grooved bevel edge and corresponding groove, or simply with the contact edges flat as in the split bifocal. It is only practicable to use Perfection Bifocals in frames and consequently they are supplied only with bevel outside edge in sizes of 1, 0 and 00 eye.

Opifex Bifocal—These lenses are an improvement upon the cement bifocal, the wafer being almost invisible. This is accomplished by grinding the wafers very thin. During the grinding process they are supported by glass bodies, from which they are slid off onto the major lens. The operation of edging the wafers is done while they are still attached to the glass bodies, thus insuring a perfect knife edge.

These lenses are ground in accordance with the present (D) method of refraction. They neutralize with our double convex and concave test lenses.

PRICES FOR BIFOCAL LENSES

CENTEX

Per Dozen Pairs	BEVEL OR RIMLESS EDGE Eye Sizes 1	0	00	000
Cement				
1.25 Curve				
0.12 to 2.00 +	$4.50	$4.60	$4.75	$5.00
2.25 to 4.25 +	5.00	5.10	5.25	5.50
4.50 to 6.00 +	5.50	5.60	5.75	6.00
6.50 to 8.00 +	6.00	6.10	6.25	6.50
6.00 Curve				
0.12 to 2.00 +	13.50	13.65	14.00	14.35
2.25 to 4.25 +	15.00	15.15	15.50	15.85
4.50 to 6.00 +	16.50	16.65	17.00	17.35
6.50 to 8.00 +	18.00	18.15	18.50	18.85
Opifex				
1.25 Curve				
0.12 to 2.00 +	11.25	11.35	11.50	11.75
2.25 to 4.25 +	12.75	12.85	13.00	13.25
6.00 Curve				
0.12 to 2.00 +	19.00	19.15	19.50	19.85
2.25 to 4.25 +	20.00	20.15	20.50	20.85
Split				
0.12 to 2.00 +	1.75	2.00	2.25	2.50
2.25 to 4.25 +	2.00	2.25	2.50	2.75
4.50 to 6.00 +	2.25	2.50	2.75	3.00
6.50 to 8.00 +	2.50	2.75	3.00	3.25
Perfection				
Grooved or Flat				
0.12 to 2.00 +	3.75	3.90	4.05	4.40
2.25 to 4.25 +	4.00	4.15	4.30	4.65
4.50 to 6.00 +	4.25	4.40	4.55	4.90
6.50 to 8.00 +	4.50	4.65	4.80	5.15
Perfection				
Uppers				
Grooved or Flat				
0.12 to 2.00 +	2.25	2.40	2.55	2.90
2.25 to 4.25 +	2.40	2.55	2.70	3.05
4.50 to 6.00 +	2.55	2.70	2.85	3.20
6.50 to 8.00 +	2.70	2.85	3.00	3.35
Perfection				
Lowers				
Grooved or Flat				
0.12 to 2.00 +	1.50	1.50	1.50	1.50
2.25 to 4.25 +	1.60	1.60	1.60	1.60
4.50 to 6.00 +	1.70	1.70	1.70	1.70
6.50 to 8.00 +	1.80	1.80	1.80	1.80

DRILLING BIFOCAL LENSES

Per Dozen Pairs

1 Hole	2 Holes	3 Holes	4 Holes
$0.20	$0.25	$0.30	$0.40

PRICES FOR BIFOCAL WAFERS
CENTEX

Per Dozen Pairs	1.25 Curve +	Plano +	Other Curves
Uncut			(Charged according to strongest curve)
Cement			
(Round 30 mm Diameter)			
0.12 to 2.00	$3.00	$4.50	$7.50
2.25 to 4.25	3.75	5.25	8.25
4.50 to 6.00	4.50	6.00	9.00
6.50 to 8.00	6.00	7.50	10.00
(Round 38 mm Diameter)			
0.12 to 2.00	4.50	6.00	
2.25 to 4.25	5.25	6.75	
4.50 to 6.00	6.00	7.50	
6.50 to 8.00	7.50	9.00	
(Round 19 mm Diameter)			
0.12 to 2.00	5.25	6.00	8.25
2.25 to 4.25	6.00	6.75	9.00
4.50 to 6.00	6.75	7.50	9.75
6.50 to 8.00	8.25	9.00	11.25
Opifex			
(Round 19 mm Diameter, on Bodies)			
0.12 to 2.00	7.50	8.75	10.00
2.25 to 4.25	8.25	9.50	11.00
4.50 to 6.00	9.00	10.50	12.00
6.50 to 8.00	10.00	11.00	13.50
Edged			
Cement			
(25 x 13 mm)			
0.12 to 2.00	3.00	4.25	7.25
2.25 to 4.25	3.50	4.75	7.75
4.50 to 6.00	4.25	5.50	8.50
6.50 to 8.00	5.25	6.50	9.50
(18 mm Round)			
0.12 to 2.00	6.00	6.75	9.00
2.25 to 4.25	6.75	7.50	9.75
4.50 to 6.00	7.50	8.25	10.50
6.50 to 8.00	9.00	9.75	12.00
Opifex			
(Knife Edge, Round 18 mm Diameter, on Bodies)			
0.12 to 2.00	9.00	10.25	11.50
2.25 to 4.25	9.75	11.00	12.50
4.50 to 6.00	10.50	12.00	13.50
6.50 to 8.00	11.50	12.50	15.00

KRYPTOK BIFOCAL BLANKS AND LENSES

Flat Blank

Toric Blank

Kryptoks are made of two pieces of optical glass of different substance and hence of different foci, or "strength," fused into a single piece of glass and ground as a single lens.

They differ from the cemented bifocal in that they have no distinct line of demarcation between the distance and reading portions. As the two pieces of glass are firmly fused together, they form practically one solid piece, and the possibility of falling apart or collecting of dirt in the creases, therefore, is eliminated.

PRICES FOR
KRYPTOK BIFOCAL BLANKS AND LENSES

These blanks and lenses are made under U. S. Patents Nos. 637,444 and 876,933, and sold under terms and conditions established by the Patentees.

Per Pair	Uncut	Edged	Edged and Drilled	Minimum Retail Prices Net
Blanks				See also extras
Rough				
Flat	$2.50			
Toric	3.50			
Blanks				
Plano or Sphero One Side				
Flat	3.00			
Toric	4.50			
Lenses				
(Finished on both sides)				
Flat				
Plano or Sphero	3.50	$4.00	$4.25	$8.00
Cylinder or Sphero-Cylinder	4.50	5.00	5.25	10.00
Sphero-Prism	4.50	5.00	5.25	10.00
Cylinder-Prism or Sphero-Cylinder Prism	5.25	5.75	6.00	12.00
Toric				
Plano or Sphero	5.50	6.00	6.25	10.00
Cylinder or Sphero-Cylinder	6.50	7.00	7.25	13.00
Sphero-Prism	6.50	7.00	7.25	13.00
Cylinder-Prism or Sphero-Cylinder Prism	7.75	8.25	8.50	15.00

Single blanks or lenses half price of pairs.

EXTRAS—Per pair to list prices

Colored, except Crookes, Noviol and Euphos	$1.50	Blanks thicker than 7 mm	$1.00
Crookes, Noviol and Euphos	2.50	Cataracts (8.50 to 20.00 D)	1.50
Larger than can be made from regular size blanks	1.50	Larger Segments than standard size	1.00
Flat blanks with minus or plus curve greater than 4.00 D	1.00	Toric blanks with segments fused on inner curve (applies to tories only)	1.00

Single lenses half price.

SURFACING OF KRYPTOK BLANKS—Per pair

	Flats	Torics
Plano or Sphero one side	$0.50	$1.00
Plano or Sphero both sides	1.00	2.00
Cylinder, Sphero-Cylinder or Sphero-Prisms	2.00	3.00
Cylinder-Prisms or Sphero-Cylinder Prisms	2.75	4.25

EXTRAS—Per pair to minimum retail prices

Colored, except Crookes, Noviol and Euphos	$1.50
Crookes, Noviol and Euphos	2.50
Larger than can be made from regular size blank	2.00
Cataracts (8.50 to 20.00 D)	2.00
Larger segments than standard size	1.00

Single lenses half price.

BAUSCH & LOMB KRYPTOK CHART

FLAT BLANKS

Curves on Disc Side	READING ADDITIONS																												
	0.50	0.62	0.75	0.87	1.00	1.12	1.25	1.37	1.50	1.62	1.75	1.87	2.00	2.12	2.25	2.37	2.50	2.62	2.75	2.87	3.00	3.12	3.25	3.37	3.50	3.62	3.75	3.87	4.00	4.25	4.50
Plano	10	13	16	19	21	24	26	29	32	35	37	40	43	45	48	50	53	56	59	61	65	68	70	72	75	91	93	94	95	98	101
+ 0.12	10	13	16	18	20	23	25	28	31	34	36	39	42	45	47	50	52	55	58	61	65	68	70	72	75	91	93	94	95	98	101
+ 0.25	9	12	15	18	20	23	25	28	31	34	36	39	42	44	47	49	52	55	58	60	64	67	69	71	74	90	92	93	94	97	100
+ 0.37	9	12	15	17	19	22	24	27	30	33	35	38	41	44	46	49	51	54	57	60	64	67	69	71	74	90	92	93	94	97	100
+ 0.50	8	11	14	17	19	22	24	27	30	33	35	38	41	43	46	48	51	54	57	59	63	66	68	70	73	89	91	92	93	96	99
+ 0.62	8	11	14	16	18	21	23	26	29	32	34	37	40	43	45	48	50	53	56	59	63	66	68	70	73	89	91	92	93	96	99
+ 0.75 + 0.87	7	10	13	16	18	21	23	26	29	32	34	37	40	42	45	47	50	53	56	58	62	65	67	69	72	88	90	91	92	95	98
+ 1.00 + 1.12	6	9	12	15	17	20	22	25	28	31	33	36	39	41	44	46	49	52	55	57	61	64	66	68	71	74	89	90	91	94	97
+ 1.25 + 1.37	5	8	11	14	16	19	21	24	27	30	32	35	38	40	43	45	48	51	54	56	60	63	65	67	70	73	88	89	90	93	96
+ 1.50 + 1.62	4	7	10	13	15	18	20	23	26	29	31	34	37	39	42	44	47	50	53	55	59	62	64	66	69	72	74	88	89	92	95
+ 1.75 + 1.87	3	6	9	12	14	17	19	22	25	28	30	33	36	38	41	43	46	49	52	54	58	61	63	65	68	71	73	74	88	91	94
+ 2.00 + 2.12	2	5	8	11	13	16	18	21	24	27	29	32	35	37	40	42	45	48	51	53	57	60	62	64	67	70	72	73	87	90	93
+ 2.25 + 2.37	1	4	7	10	12	15	17	20	23	26	28	31	34	36	39	41	44	47	50	52	56	59	61	63	66	69	71	72	86	89	92
+ 2.50 + 2.62	...	...	6	9	11	14	16	19	22	25	27	30	33	35	38	40	43	46	49	51	55	58	60	62	65	68	70	71	85	88	91
+ 2.75 + 2.87	...	...	5	8	10	13	15	18	21	24	26	29	32	34	37	39	42	45	48	50	54	57	59	61	64	67	69	71	84	87	90
+ 3.00 + 3.12	...	...	...	7	9	12	14	17	20	23	25	28	31	33	36	38	41	44	47	49	53	56	58	60	63	66	68	70	83	86	89
+ 3.25 + 3.37	...	...	...	...	8	11	13	16	19	22	24	27	30	32	35	37	40	43	46	48	52	55	57	59	62	65	67	69	74	85	88
+ 3.50 + 3.62	...	...	...	...	...	...	...	12	15	18	21	23	26	29	31	34	36	39	42	45	47	51	54	56	58	61	64	66	68	73	84	87
+ 3.75 + 3.87	...	...	...	...	...	...	...	11	14	17	20	22	25	28	30	33	35	38	41	44	46	50	53	55	57	60	63	65	67	72	83	86
+ 4.00	...	...	...	...	...	...	...	10	13	16	19	21	24	27	29	32	34	37	40	43	45	49	52	54	56	59	62	64	66	71	82	85
+ 4.25	...	...	...	...	...	...	...	...	12	15	18	20	23	26	28	31	33	36	39	42	44	48	51	53	55	58	61	63	65	70	81	84
+ 4.50	...	...	...	...	...	...	...	...	11	14	17	19	22	25	27	30	32	35	38	41	43	47	50	52	54	57	60	62	64	69	75	83
− 0.12 − 0.25	11	14	17	20	22	25	27	30	33	36	38	41	44	46	49	51	54	57	60	63	66	69	71	73	90	92	93	95	96	99	102
− 0.37 − 0.50	12	15	18	21	23	26	28	31	34	37	39	42	45	47	50	52	55	58	61	64	67	70	72	74	91	93	94	96	97	100	103
− 0.62 − 0.75	13	16	19	22	24	27	29	32	35	38	40	43	46	48	51	53	56	59	62	65	68	71	73	75	92	94	95	97	98	101	104
− 0.87 − 1.00	14	17	20	23	25	28	30	33	36	39	41	44	47	49	52	54	57	60	63	66	69	72	74	92	93	95	96	98	99	102	105
− 1.12 − 1.25	15	18	21	24	26	29	31	34	37	40	42	45	48	50	53	55	58	61	64	67	70	73	75	93	94	96	97	99	100	103	106
− 1.37 − 1.50	16	19	22	25	27	30	32	35	38	41	43	46	49	51	54	56	59	62	65	68	71	74	92	94	95	97	98	100	101	104	107
− 1.62 − 1.75	17	20	23	26	28	31	33	36	39	42	44	47	50	52	55	57	60	63	66	69	72	75	93	95	96	98	99	101	102	105	108
− 1.87 − 2.00	418	421	424	427	429	432	434	437	440	443	445	448	451	453	456	458	461	464	467	470	473	492	494	496	497	499	500	502	503	506	509
− 2.12 − 2.25	419	422	425	428	430	433	435	438	441	444	446	449	452	454	457	459	462	465	468	471	474	493	495	497	498	500	501	503	504	507	510
− 2.37 − 2.50	420	423	426	429	431	434	436	439	442	445	447	450	453	455	458	460	463	466	469	472	475	494	496	498	499	501	502	504	505	508	511
− 2.62 − 2.75	421	424	427	430	432	435	437	440	443	446	448	451	454	456	459	461	464	467	470	473	494	495	497	499	500	502	503	505	506	509	512
− 2.87 − 3.00	422	425	428	431	433	436	438	441	444	447	449	452	455	457	460	462	465	468	471	474	495	496	498	500	501	503	504	506	507	510	513
− 3.25	423	426	429	432	434	437	439	442	445	448	450	453	456	458	461	463	466	469	472	475	496	497	499	501	502	504	505	507	508	511	514
− 3.50	424	427	430	433	435	438	440	443	446	449	451	454	457	459	462	464	467	470	473	495	497	498	500	502	503	505	506	508	509	512	515
− 3.75	425	428	431	434	436	439	441	444	447	450	452	455	458	460	463	465	468	471	473	496	498	499	501	503	504	506	507	509	510	513	516
− 4.00	626	629	632	635	637	640	642	645	648	651	653	656	659	661	664	666	669	672	696	697	699	700	702	704	705	707	708	710	711	714	717
− 4.25	627	630	633	636	638	641	643	646	649	652	654	657	660	662	665	667	670	673	697	698	700	701	703	705	706	708	709	711	712	715	718
− 4.50	628	631	634	637	639	642	644	647	650	653	655	658	661	663	666	668	671	674	698	699	701	702	704	706	707	709	710	712	713	716	719
− 4.75	629	632	635	638	640	643	645	648	651	654	656	659	662	664	667	669	672	675	699	700	702	703	705	707	708	710	711	713	714	717	720
− 5.00	630	633	636	639	641	644	646	649	652	655	657	660	663	665	668	670	673	676	700	701	703	704	706	708	709	711	712	714	715	718	721
Curves on Disc Side	0.50	0.62	0.75	0.87	1.00	1.12	1.25	1.37	1.50	1.62	1.75	1.87	2.00	2.12	2.25	2.37	2.50	2.62	2.75	2.87	3.00	3.12	3.25	3.37	3.50	3.62	3.75	3.87	4.00	4.25	4.50
	READING ADDITIONS																														

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BAUSCH & LOMB KRYPTOK CHART

TORIC BLANKS

Curves on Disc Side	READING ADDITIONS																										
	0.50	0.62	0.75	0.87	1.00	1.12	1.25	1.37	1.50	1.62	1.75	1.87	2.00	2.12	2.25	2.37	2.50	2.62	2.75	2.87	3.00	3.12	3.25	3.37	3.50	3.75	4.00
+ 3.00 + 3.12	212	215	218	221	223	226	228	231	234	236	239	242	245	247	250	252	255	258	261	264	267	269	271	274	277	281	287
+ 3.25 + 3.37	211	214	217	220	222	225	227	230	233	235	238	241	244	246	249	251	254	257	260	263	266	268	270	273	276	280	286
+ 3.50 + 3.62	210	213	216	219	221	224	226	229	232	234	237	240	243	245	248	250	253	256	259	262	265	267	269	272	275	279	285
+ 3.75 + 3.87	209	212	215	218	220	223	225	228	231	233	236	239	242	244	247	249	252	255	258	261	264	266	268	271	274	278	284
+ 4.00 + 4.12	208	211	214	217	219	222	224	227	230	232	235	238	241	243	246	248	251	254	257	260	263	265	267	270	273	277	283
+ 4.25 + 4.37	207	210	213	216	218	221	223	226	229	231	234	237	240	242	245	247	250	253	256	259	262	264	266	269	272	276	282
+ 4.50 + 4.62	206	209	212	215	217	220	222	225	228	230	233	236	239	241	244	246	249	252	255	258	261	263	265	268	271	275	281
+ 4.75 + 4.87	205	208	211	214	216	219	221	224	227	229	232	235	238	240	243	245	248	251	254	257	260	262	264	267	270	274	280
+ 5.00 + 5.12	204	207	210	213	215	218	220	223	226	228	231	234	237	239	242	244	247	250	253	256	259	261	263	266	269	273	279
+ 5.25 + 5.37	203	206	209	212	214	217	219	222	225	227	230	233	236	238	241	243	246	249	252	255	258	260	262	265	268	272	278
+ 5.50 + 5.62	202	205	208	211	213	216	218	221	224	226	229	232	235	237	240	242	245	248	251	254	257	259	261	264	267	271	277
+ 5.75 + 5.87	312	315	318	320	323	325	328	331	334	336	339	342	345	347	350	352	355	358	361	363	366	368	371	374	377	382	387
+ 6.00 + 6.12	311	314	317	319	322	324	327	330	333	335	338	341	344	346	349	351	354	357	360	362	365	367	370	373	376	381	386
+ 6.25 + 6.37	310	313	316	318	321	323	326	329	332	334	337	340	343	345	348	350	353	356	359	361	364	366	369	372	375	380	385
+ 6.50 + 6.62	309	312	315	317	320	322	325	328	331	333	336	339	342	344	347	349	352	355	358	360	363	365	368	371	374	379	384
+ 6.75 + 6.87	308	311	314	316	319	321	324	327	330	332	335	338	341	343	346	348	351	354	357	359	362	364	367	370	373	378	383
+ 7.00 + 7.12	307	310	313	315	318	320	323	326	329	331	334	337	340	342	345	347	350	353	356	358	361	363	366	369	372	377	382
+ 7.25 + 7.37	306	309	312	314	317	319	322	325	328	330	333	336	339	341	344	346	349	352	355	357	360	362	365	368	371	376	381
+ 7.50 + 7.62	305	308	311	313	316	318	321	324	327	329	332	335	338	340	343	345	348	351	354	356	359	361	364	367	370	375	380
+ 7.75 + 7.87	304	307	310	312	315	317	320	323	326	328	331	334	337	339	342	344	347	350	353	355	358	360	363	366	369	374	379
+ 8.00 + 8.12	303	306	309	311	314	316	319	322	325	327	330	333	336	338	341	343	346	349	352	354	357	359	362	365	368	373	378
+ 8.25 + 8.37	302	305	308	310	313	315	318	321	324	326	329	332	335	337	340	342	345	348	351	353	356	358	361	364	367	372	377
+ 8.50 + 8.62	301	304	307	309	312	314	317	320	323	325	328	331	334	336	339	341	344	347	350	352	355	357	360	363	366	371	376
+ 8.75 + 8.87	300	303	306	308	311	313	316	319	322	324	327	330	333	335	338	340	343	346	349	351	354	356	359	362	365	370	375
+ 9.00 + 9.12	...	302	305	307	310	312	315	318	321	323	326	329	332	334	337	339	342	345	348	350	353	355	358	361	364	369	374
+ 9.25 + 9.37	...	301	304	306	309	311	314	317	320	322	325	328	331	333	336	338	341	344	347	349	352	354	357	360	363	368	373
+ 9.50 + 9.62	...	300	303	305	308	310	313	316	319	321	324	327	330	332	335	337	340	343	346	348	351	353	356	359	362	367	372
+ 9.75 + 9.87	...	...	302	304	307	309	312	315	318	320	323	326	329	331	334	336	339	342	345	347	350	352	355	358	361	366	371
+ 10.00 + 10.12	...	...	301	303	306	308	311	314	317	319	322	325	328	330	333	335	338	341	344	346	349	351	354	357	360	365	370
+ 10.25 + 10.37	...	...	300	302	305	307	310	313	316	318	321	324	327	329	332	334	337	340	343	345	348	350	353	356	359	364	369
+ 10.50 + 10.62	...	...	..	301	304	306	309	312	315	317	320	323	326	328	331	333	336	339	342	344	347	349	352	355	358	363	368
+ 10.75 + 10.87	...	...	...	300	303	305	308	311	314	316	319	322	325	327	330	332	335	338	341	343	346	348	351	354	357	362	367
+ 11.00 + 11.12	...	...	...	...	302	304	307	310	313	315	318	321	324	326	329	331	334	337	340	342	345	347	350	353	356	361	366
+ 11.25 + 11.37	...	...	...	..	301	303	306	309	312	314	317	320	323	325	328	330	333	336	339	341	344	346	349	352	355	360	365
+ 11.50 + 11.62	...	...	...	..	300	302	305	308	311	313	316	319	322	324	327	329	332	335	338	340	343	345	348	351	354	359	364
+ 11.75 + 11.87	...	...	...	...	...	301	304	307	310	312	315	318	321	323	326	328	331	334	337	339	342	344	347	350	353	358	363
+ 12.00 + 12.12	...	...	...	...	...	300	303	306	309	311	314	317	320	322	325	327	330	333	336	338	341	343	346	349	352	357	362
+ 12.25 + 12.37	...	...	...	...	..	...	302	305	308	310	313	316	319	321	324	326	329	332	335	337	340	342	345	348	351	356	361
+ 12.50 + 12.62	...	...	...	...	...	...	301	304	307	309	312	315	318	320	323	325	328	331	334	336	339	341	344	347	350	355	360
+ 12.75	...	...	...	...	...	...	300	303	306	308	311	314	317	319	322	324	327	330	333	335	338	340	343	346	349	354	359
+ 13.00	...	...	...	...	...	...	...	302	305	307	310	313	316	318	321	323	326	329	332	334	337	339	342	345	348	353	358
+ 13.25	...	...	...	...	...	...	...	...	304	306	309	312	315	317	320	322	325	328	331	333	336	338	341	344	347	352	357
Curves on Disc Side	0.50	0.62	0.75	0.87	1.00	1.12	1.25	1.37	1.50	1.62	1.75	1.87	2.00	2.12	2.25	2.37	2.50	2.62	2.75	2.87	3.00	3.12	3.25	3.37	3.50	3.75	4.00
	READING ADDITIONS																										

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KRYPTOK BIFOCAL DIRECTIONS

The following directions will be found useful in selecting and surfacing blanks:

Selection of Blank—First determine form and curves of the lens required and proceed to find blank number in the following manner:

Trace down the "disc side" column of the chart to the desired curve, then across the top line to the desired reading addition; the figure in the intersecting space will indicate the number of blank to be used. This can be readily verified in the following examples, all of which have +1.00 additions:

+1.00 Sph. in Plano-Convex form (disc on plano side) Blank No. 21.

+1.00 Sph. in Plano-Convex form (disc on +1.00 side) Blank No. 17.

+1.00 Sph. in Periscopic form (disc on −1.25 side) Blank No. 26.

+1.00 Sph. in Periscopic form (disc on +2.25 side) Blank No. 12.

+1.00 Sph. in Meniscus form−6.00 Curve (disc on +7.00 curve) Blank No. 318.

+1.00 Plano-Cyl. in flat form (disc on plano side) Blank No. 21.

Surfacing—Always grind the disc side first.

Blocking—Both the blank, as well as the body on which it is to be blocked, should be heated and blocking wax applied to each, then glass pressed onto body while wax is still warm. The glass should be gradually and uniformly heated and on no account put into direct flame of the gas. It should be given time to cool before grinding and never cooled by dipping into water.

Roughing—Coarse emery may be used safely as follows:

From Nos. 1 to 10 until disc is 6.5 mm larger than finished size.

From Nos. 11 to 40 until disc is 5.0 mm larger than finished size.

From Nos. 41 up until disc is 3.0 mm larger than finished size.

The weaker the addition, the more rapidly will the size of disc be reduced when smoothing.

Smoothing—Second emery may be used as follows:

From Nos. 1 to 10 until disc is 3.5 mm larger than finished size.

From Nos. 11 to 40 until disc is 3.0 mm larger than finished size.

From Nos. 41 up until disc is 2.0 mm larger than finished size.

Fine Grinding—Bausch & Lomb fine emery should be used and the disc left 0.5 mm larger than finished size, as polishing will reduce it that much.

Polishing—Use Bausch & Lomb rouge and either piano felt or a closely woven cloth. It is better not to try to force the work, but to polish slowly. Better work will be obtained by so doing.

Taking Glass off Body—Do not take off by jarring, preferably let cold water

run over the back of body, thereby chilling it. In a few moments the pitch will contract and the lens can be readily separated from it.

Surfacing Second Side—Use the same care in blocking as on the first side. If lens is to be ground to a cylinder or toric surface, indicate the axis on the finished side by marking a line with blue wax pencil.

Avoid Prismatic Effect—Determine height the disc is to be when lens is edged, and after allowing sufficient margin, cut away surplus glass on both upper and lower portions of blank. The body to be used should conform nearly in curve to that of the curve of blank to be blocked on it. This rule holds good whether for first or second side. Do not block a toric Kryptok on a flat body, or vice versa, as an undue strain will be put on the lens. Do not grind into the disc when grinding the second side. It can be avoided by following the table given below. This table will show what the actual thickness of the flint disc should be at its center, plus a small margin for safe grinding. If the lens is ground thinner at this point, the blank will be ruined by grinding into the disc.

Addition	Minimum Thickness	Addition	Minimum Thickness	Addition	Minimum Thickness
0.50	0.4 mm	1.62	0.9 mm	2.62	1.3 mm
0.62	0.5 mm	1.75	1.0 mm	2.75	1.4 mm
0.75	0.5 mm	1.87	1.0 mm	2.87	1.5 mm
0.87	0.6 mm	2.00	1.1 mm	3.00	1.5 mm
1.00	0.6 mm	2.12	1.1 mm	3.25	1.6 mm
1.12	0.7 mm	2.25	1.2 mm	3.50	1.7 mm
1.25	0.7 mm	2.37	1.2 mm	3.75	1.8 mm
1.37	0.8 mm	2.50	1.3 mm	4.00	1.9 mm
1.50	0.8 mm				

This scale is computed for 18 mm discs. If the disc is to be left larger than 18 mm diameter, the lens should be left thicker at that point.

If discs are to "set in" for reading, proceed as follows: Before marking lens for axis and before surfacing cylinder side, rotate the lens 5° for each millimeter it is to be set in.

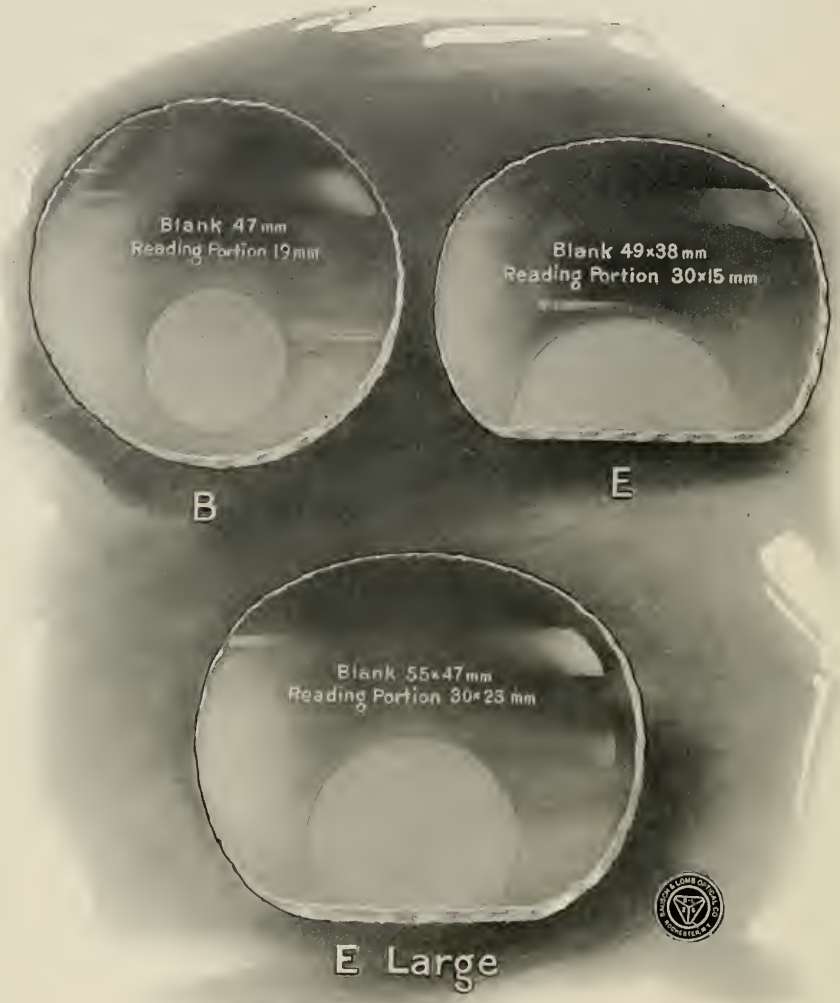
If lens is for Right eye, rotate disc toward left.

If lens is for Left eye, rotate disc toward right.

Then mark the axis on the side upon which the cylinder surface is to be ground in the usual manner, using protractor. Turn lens over and mark again on finished disc side in wax pencil, tracing over the mark shown on the side to be ground.

ULTEX ONEPIECE BIFOCAL BLANKS AND LENSES

"UNI-BIFO (LUXE)"
(Registered Trade Mark)

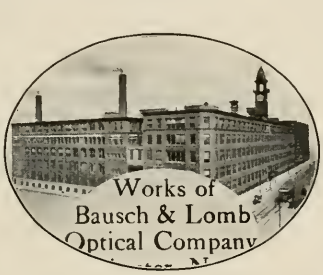


ULTEX Onepiece Bifocal Lenses show no marked line of separation between the distance and reading portions. They are *single, solid* lenses, although ground with two foci. Being of a single piece of glass, they are free from disturbing color effects.

Every Ultex bifocal lens of our manufacture has engraved upon its inner surface near the right central margin our trade mark, (B&L). While this engraving can only be seen with the aid of a magnifying glass, it is important—guaranteeing the lens to be made with the same scientific accuracy and care as all Bausch & Lomb ophthalmic lenses.

This new onepiece bifocal is justly considered one of the greatest triumphs yet achieved in the development of ophthalmic lenses for double vision. Its introduction has marked a new era in refraction work. Combining in a single lens the functional properties of the old cemented bifocals, it is marked by an ingenuity of workmanship and, with the accurate simplicity of its optical detail, removes practically all of the objections which were ever raised against the use of bifocals generally.

The Ultex Onepiece is made by grinding in the lower portion of the lens a different focus for reading, and is as light and graceful a bifocal as there is on the market. It can be made to fill practically any conceivable prescription in plus and minus combinations, combined with cylinders on both portions of the lens, or on that of the distance vision only, and with any prismatic effect desired. This high precision work is only rendered possible by the use of the most perfectly constructed machines and accessories, in which the permissible error is reduced to a minimum.



All Ultex bifocal lenses of our manufacture are marketed under the registered trade mark of "Uni-Bifo (Luxe)." Their function is indicated by the accompanying illustration, which has been quite widely used in connection with our Ultex publicity. Although showing no sharp line of demarcation in the lens itself, it gives a miniature view of our main factory through the distance portion and ordinary type matter through the reading portion.

On pages 128 and 129 will be found directions for selecting and surfacing Ultex Onepiece blanks. A careful study of these directions is strongly recommended, particularly as to surfacing, as the grinding of these blanks requires more than ordinary care, and the expense resulting from unnecessary loss of time and material may thus be eliminated.

PRICES FOR ULTEX ONEPIECE BIFOCAL BLANKS AND LENSES

"UNI-BIFO (LUXE)"

(Registered Trade Mark)

SUPPLIED IN TORIC FORM ONLY

Regular Sizes { B. Blank 47 mm Round. Reading Portion 19 mm.
E. Blank 49 x 38 mm. Reading Portion 30 x about 15 mm.

Large Size E. Blank 55 x 47 mm. Reading Portion 30 x about 24 mm.

These lenses are made under U. S. Patents Nos. 836,486; 925,802; 932,965; 954,772 and 946,571 and sold under terms and conditions established by the Patentees.

Per Pair	E STYLE					B STYLE				
	Trade List Prices				Retail Prices Net	Trade List Prices				Retail Prices Net
	Blanks	Finished Both Sides				Blanks	Finished Both Sides			
		Uncut	Edged	Edged and Drilled			Uncut	Edged	Edged and Drilled	
Blanks (Bifocal Side Finished)										
Regular Sizes . . .	$ 7.50					$ 7.50				
Sizes larger than Regular	15.00					15.00				
Combinations not on Chart.	15.00					15.00				
Sphero (Finished on Both Sides)										
Regular Sizes . . .		$ 8.50	$ 9.00	$ 9.25	$15.00		$ 8.50	$ 9.00	$ 9.25	$15.00
Sizes larger than Regular		16.00	16.50	16.75	22.50		16.00	16.50	16.75	22.50
Combinations not on Chart.		16.00	16.50	16.75	22.50		16.00	16.50	16.75	22.50
Cylinder and Sphero-Cylinder (Finished on Both Sides)										
Regular Sizes . . .		8.50	9.00	9.25	15.00		8.50	9.00	9.25	15.00
Sizes larger than Regular		16.00	16.50	16.75	22.50		16.00	16.50	16.75	22.50
Combinations not on Chart.		16.00	16.50	16.75	22.50		16.00	16.50	16.75	22.50
Single Blanks and Lenses, Half Price of Pairs										

EXTRA	Per Pair
For Standard Shade, colored lenses, except Crookes, Noviol and Euphos	$2.00
For Standard Shade, colored lenses, Crookes, Noviol and Euphos	3.00
For Reading Additions stronger than 4.50 D	1.50

ULTEX ONEPIECE BIFOCAL CHART

Our chart is based on the "Four Curve" plan, as shown below, eighty blanks constituting a complete assortment in the given diopters. While a somewhat larger equipment of tools is thus necessary than would be the case with a single base curve system, the stock of blanks required involves a decidedly smaller investment.

TABLE OF BLANK NUMBERS

Sphero Distance Power	Inner Curve	READING ADDITIONS						
		0.50	0.75	0.87	1.00	1.12	1.25	1.37
0.00 to +2.00	−6.00	1014	1016	1017	1018	1019	1020	1021
+2.25 to +4.00	−4.00	2614	2616	2617	2618	2619	2620	2621
−0.12 to −1.00	−6.00	1014	1016	1017	1018	1019	1020	1021
−1.12 to −3.00	−8.00	12614	12616	12617	12618	12619	12620	12621
−3.25 to −4.00	−9.00	13414	13416	13417	13418	13419	13420	13421

Sphero Distance Power	Inner Curve	READING ADDITIONS						
		1.50	1.75	2.00	2.25	2.50	2.75	3.00
0.00 to +2.00	−6.00	1022	1024	1026	1028	1030	1032	1034
+2.25 to +4.00	−4.00	2622	2624	2626	2628	2630	2632	2634
−0.12 to −1.00	−6.00	1022	1024	1026	1028	1030	1032	1034
−1.12 to −3.00	−8.00	12622	12624	12626	12628	12630	12632	12634
−3.25 to −4.00	−9.00	13422	13424	13426	13428	13430	13432	13434

Sphero Distance Power	Inner Curve	READING ADDITIONS					
		3.25	3.50	3.75	4.00	4.25	4.50
−0.00 to +2.00	−6.00	1036	1038	1040	1042	1044	1046
+2.25 to +4.00	−4.00	2636	2638	2640	2642	2644	2646
−0.12 to −1.00	−6.00	1036	1038	1040	1042	1044	1046
−1.12 to −3.00	−8.00	12636	12638	12640	12642	12644	12646
−3.25 to −4.00	−9.00	13436	13438	13440	13442	13444	13446

ULTEX ONEPIECE BIFOCAL TABLE OF SURFACING TOOLS

The table on this and the opposite page is based on the "Four Curve" plan, in which eighty blanks complete the entire range of focus combinations; it is designed to afford an easy method of selecting curves to surface a given distance result. The left-hand column shows the distance powers; the columns to the right give the cylinder powers, the heavy face figures in the intersecting spaces indicating the inner curve of distance portion of blank.

DISTANCE POWER

+CYLINDER POWER

+Sphero	Meniscus	+.12	+.25	+.37	+.50	+.62	+.75	+1.00	+1.25	+1.50	+1.75	+2.00	+2.25	+2.50	+2.75	+3.00
PLANO	6 6.00 Sph.	6 6.00 6.12	6 6.00 6.25	6 6.00 6.37	6 6.00 6.50	6 6.00 6.62	6 6.00 6.75	6 6.00 7.00	6 6.00 7.25	6 6.00 7.50	6 6.00 7.75	6 6.00 8.00	6 6.00 8.25	6 6.00 8.50	6 6.00 8.75	6 6.00 9.00
+ .12	6 6.12	6 6.12 6.25	6 6.12 6.37	6 6.12 6.50	6 6.12 6.62	6 6.12 6.75	6 6.12 6.87	6 6.12 7.12	6 6.12 7.37	6 6.12 7.62	6 6.12 7.87	6 6.12 8.12				
+ .25	6 6.25	6 6.25 6.37	6 6.25 6.50	6 6.25 6.62	6 6.25 6.75	6 6.25 6.87	6 6.25 7.00	6 6.25 7.25	6 6.25 7.50	6 6.25 7.75	6 6.25 8.00	6 6.25 8.25	6 6.25 8.50	6 6.25 8.75	6 6.25 9.00	6 6.25 9.25
+ .37	6 6.37	6 6.37 6.50	6 6.37 6.62	6 6.37 6.75	6 6.37 6.87	6 6.37 7.00	6 6.37 7.12	6 6.37 7.37	6 6.37 7.62	6 6.37 7.87	6 6.37 8.12	6 6.37 8.37				
+ .50	6 6.50	6 6.50 6.62	6 6.50 6.75	6 6.50 6.87	6 6.50 7.00	6 6.50 7.12	6 6.50 7.25	6 6.50 7.50	6 6.50 7.75	6 6.50 8.00	6 6.50 8.25	6 6.50 8.50	6 6.50 8.75	6 6.50 9.00	6 6.50 9.25	6 6.50 9.50
+ .62	6 6.62	6 6.62 6.75	6 6.62 6.87	6 6.62 7.00	6 6.62 7.12	6 6.62 7.25	6 6.62 7.37	6 6.62 7.62	6 6.62 7.87	6 6.62 8.12	6 6.62 8.37	6 6.62 8.62				
+ .75	6 6.75	6 6.75 6.87	6 6.75 7.00	6 6.75 7.12	6 6.75 7.25	6 6.75 7.37	6 6.75 7.50	6 6.75 7.75	6 6.75 8.00	6 6.75 8.25	6 6.75 8.50	6 6.75 8.75	6 6.75 9.00	6 6.75 9.25	6 6.75 9.50	6 6.75 9.75
+1.00	6 7.00	6 7.00 7.12	6 7.00 7.25	6 7.00 7.37	6 7.00 7.50	6 7.00 7.62	6 7.00 7.75	6 7.00 8.00	6 7.00 8.25	6 7.00 8.50	6 7.00 8.75	6 7.00 9.00	6 7.00 9.25	6 7.00 9.50	6 7.00 9.75	6 7.00 10.00
+1.25	6 7.25	6 7.25 7.37	6 7.25 7.50	6 7.25 7.62	6 7.25 7.75	6 7.25 7.87	6 7.25 8.00	6 7.25 8.25	6 7.25 8.50	6 7.25 8.75	6 7.25 9.00	6 7.25 9.25	6 7.25 9.50	6 7.25 9.75	6 7.25 10.00	6 7.25 10.25
+1.50	6 7.50	6 7.50 7.62	6 7.50 7.75	6 7.50 7.87	6 7.50 8.00	6 7.50 8.12	6 7.50 8.25	6 7.50 8.50	6 7.50 8.75	6 7.50 9.00	6 7.50 9.25	6 7.50 9.50	6 7.50 9.75	6 7.50 10.00	6 7.50 10.25	6 7.50 10.50
+1.75	6 7.75	6 7.75 7.87	6 7.75 8.00	6 7.75 8.12	6 7.75 8.25	6 7.75 8.37	6 7.75 8.50	6 7.75 8.75	6 7.75 9.00	6 7.75 9.25	6 7.75 9.50	6 7.75 9.75	6 7.75 10.00	6 7.75 10.25	6 7.75 10.50	6 7.75 10.75
+2.00	6 8.00	6 8.00 8.12	6 8.00 8.25	6 8.00 8.37	6 8.00 8.50	6 8.00 8.62	6 8.00 8.75	6 8.00 9.00	6 8.00 9.25	6 8.00 9.50	6 8.00 9.75	6 8.00 10.00	6 8.00 10.25	6 8.00 10.50	6 8.00 10.75	6 8.00 11.00
+2.25	4 6.25	4 6.25 6.37	4 6.25 6.50	4 6.25 6.62	4 6.25 6.75	4 6.25 6.87	4 6.25 7.00	4 6.25 7.25	4 6.25 7.50	4 6.25 7.75	4 6.25 8.00	4 6.25 8.25	4 6.25 8.50	4 6.25 8.75	4 6.25 9.00	4 6.25 9.25
+2.50	4 6.50	4 6.50 6.62	4 6.50 6.75	4 6.50 6.87	4 6.50 7.00	4 6.50 7.12	4 6.50 7.25	4 6.50 7.50	4 6.50 7.75	4 6.50 8.00	4 6.50 8.25	4 6.50 8.50	4 6.50 8.75	4 6.50 9.00	4 6.50 9.25	4 6.50 9.50
+2.75	4 6.75	4 6.75 6.87	4 6.75 7.00	4 6.75 7.12	4 6.75 7.25	4 6.75 7.37	4 6.75 7.50	4 6.75 7.75	4 6.75 8.00	4 6.75 8.25	4 6.75 8.50	4 6.75 8.75	4 6.75 9.00	4 6.75 9.25	4 6.75 9.50	4 6.75 9.75
+3.00	4 7.00	4 7.00 7.12	4 7.00 7.25	4 7.00 7.37	4 7.00 7.50	4 7.00 7.62	4 7.00 7.75	4 7.00 8.00	4 7.00 8.25	4 7.00 8.50	4 7.00 8.75	4 7.00 9.00	4 7.00 9.25	4 7.00 9.50	4 7.00 9.75	4 7.00 10.00
+3.25	4 7.25	4 7.25 7.37	4 7.25 7.50	4 7.25 7.62	4 7.25 7.75	4 7.25 7.87	4 7.25 8.00	4 7.25 8.25	4 7.25 8.50	4 7.25 8.75	4 7.25 9.00	4 7.25 9.25	4 7.25 9.50	4 7.25 9.75	4 7.25 10.00	4 7.25 10.25
+3.50	4 7.50	4 7.50 7.62	4 7.50 7.75	4 7.50 7.87	4 7.50 8.00	4 7.50 8.12	4 7.50 8.25	4 7.50 8.50	4 7.50 8.75	4 7.50 9.00	4 7.50 9.25	4 7.50 9.50	4 7.50 9.75	4 7.50 10.00	4 7.50 10.25	4 7.50 10.50
+3.75	4 7.75	4 7.75 7.87	4 7.75 8.00	4 7.75 8.12	4 7.75 8.25	4 7.75 8.37	4 7.75 8.50	4 7.75 8.75	4 7.75 9.00	4 7.75 9.25	4 7.75 9.50	4 7.75 9.75	4 7.75 10.00	4 7.75 10.25	4 7.75 10.50	4 7.75 10.75
+4.00	4 8.00	4 8.00 8.12	4 8.00 8.25	4 8.00 8.37	4 8.00 8.50	4 8.00 8.62	4 8.00 8.75	4 8.00 9.00	4 8.00 9.25	4 8.00 9.50	4 8.00 9.75	4 8.00 10.00	4 8.00 10.25	4 8.00 10.50	4 8.00 10.75	4 8.00 11.00

−CYLINDER POWER

−Sphero	Meniscus	−.12	−.25	−.37	−.50	−.62	−.75	−1.00	−1.25	−1.50	−1.75	−2.00	−2.25	−2.50	−2.75	−3.00
PLANO	6 6.00	6 5.87 6.00	6 5.75 6.00	6 5.62 6.00	6 5.50 6.00	6 5.37 6.00	6 5.25 6.00	6 5.00 6.00	6 4.75 8.00	8 6.50 8.00	8 6.25 8.00	8 6.00 8.00	8 5.75 8.00	8 5.50 8.00	8 5.25 8.00	8 5.00 8.00
− .12	6 5.87	6 5.75 5.87	6 5.62 5.87	6 5.50 5.87	6 5.37 5.87	6 5.25 5.87	6 5.12 5.87	6 4.87 6.00	8 6.62 8.00	8 6.37 8.00	8 6.12 7.87					
− .25	6 5.75	6 5.62 5.75	6 5.50 5.75	6 5.37 5.75	6 5.25 5.75	6 5.12 5.75	6 5.00 5.75	8 6.75 7.75	8 6.50 7.75	8 6.25 7.75	8 6.00 7.75	8 5.75 7.75	8 5.50 5.75	8 5.25 7.75	8 5.00 7.75	9 5.75 9.75
− .37	6 5.62	6 5.50 5.62	6 5.37 5.62	6 5.25 5.62	6 5.12 5.62	6 5.00 5.62	6 4.87 5.62	8 6.62 7.62	8 6.37 7.62	8 6.12 7.62		9 6.62 8.62				
− .50	6 5.50	6 5.37 5.50	6 5.25 5.50	6 5.12 5.50	6 5.00 5.50	6 4.87 5.50	8 6.75 7.50	8 6.50 7.50	8 6.25 7.50	8 6.00 7.50	8 5.75 7.50	8 5.50 7.50	8 5.25 7.50	8 5.00 7.50	9 5.75 8.50	9 5.50 8.50
− .62	6 5.37	6 5.25 5.37	6 5.12 5.37	6 5.00 5.37	6 4.87 5.37	8 6.75 7.37	8 6.62 7.37	8 6.37 7.37	8 6.12 7.37		9 6.62 8.37	9 6.37 8.37				
− .75	6 5.25	6 5.12 5.25	6 5.00 5.25	6 4.87 5.25	8 6.75 7.25	8 6.62 7.25	8 6.50 7.25	8 6.25 7.25	8 6.00 7.25	8 5.75 7.25	8 5.50 7.25	8 5.25 7.25	8 5.00 7.25	9 5.75 8.25	9 5.50 8.25	9 5.25 8.25
−1.00	6 5.00	6 4.87 5.00	8 6.75 7.00	8 6.62 7.00	8 6.50 7.00	8 6.37 7.00	8 6.25 7.00	8 6.00 7.00	8 5.75 7.00	8 5.50 7.00	8 5.25 7.00	8 5.00 7.00	9 5.75 8.00	9 5.50 8.00	9 5.25 8.00	9 5.00 8.00
−1.25	8 6.75	8 6.62 6.75	8 6.50 6.75	8 6.37 6.75	8 6.25 6.75	8 6.12 6.75	8 6.00 6.75	8 5.75 6.75	8 5.50 6.75	8 5.25 6.75	8 5.00 6.75	9 5.75 7.75	9 5.50 7.75	9 5.25 7.75	9 5.00 7.75	
−1.50	8 6.50	8 6.37 6.50	8 6.25 6.50	8 6.12 6.50	8 6.00 6.50	8 5.87 6.50	8 5.75 6.50	8 5.50 6.50	8 5.25 6.50	8 5.00 6.50	9 5.75 7.50	9 5.50 7.50	9 5.25 7.50	9 5.00 7.50		
−1.75	8 6.25	8 6.12 6.25	8 6.00 6.25	8 5.87 6.25	8 5.75 6.25	8 5.62 6.25	8 5.50 6.25	8 5.25 6.25	8 5.00 6.25	9 5.75 7.25	9 5.50 7.25	9 5.25 7.25	9 5.00 7.75			
−2.00	8 6.00	8 5.87 6.00	8 5.75 6.00	8 5.62 6.00	8 5.50 6.00	8 5.37 6.00	8 5.25 6.00	8 5.00 6.00	9 5.75 7.00	9 5.50 7.00	9 5.25 7.00	9 5.00 7.00				
−2.25	8 5.75	8 5.62 5.75	8 5.50 5.75	8 5.37 5.75	8 5.25 5.75	8 5.12 5.75	8 5.00 5.75	9 5.75 6.75	9 5.50 6.75	9 5.25 6.75	9 5.00 6.75					
−2.50	8 5.50	8 5.37 5.50	8 5.25 5.50	8 5.12 5.50	8 5.00 5.50	9 5.87 6.50	9 5.75 6.50	9 5.50 6.50	9 5.25 6.50	9 5.00 6.50						
−2.75	8 5.25	8 5.12 5.25	8 5.00 5.25	9 5.87 6.25	9 5.75 6.25	9 5.62 6.25	9 5.50 6.25	9 5.25 6.25	9 5.00 6.25							
−3.00	9 6.00	9 5.87 6.00	9 5.75 6.00	9 5.62 6.00	9 5.50 6.00	9 5.37 6.00	9 5.25 6.00	9 5.00 6.00								
−3.25	9 5.75	9 5.62 5.75	9 5.50 5.75	9 5.37 5.75	9 5.25 5.75	9 5.12 5.75	9 5.00 5.75									
−3.50	9 5.50	9 5.37 5.50	9 5.25 5.50	9 5.12 5.50	9 5.00 5.50	9 4.87 5.50										
−3.75	9 5.25	9 5.12 5.25	9 5.00 5.25	9 4.87 5.25												
−4.00	9 5.00	9 4.87 5.00														

ULTEX ONEPIECE BIFOCAL TABLE OF SURFACING TOOLS

To select tool required to grind the unfinished side of blank, refer to + ⌒ +, − ⌒ −, + ⌒ − or − ⌒ + section of table, as may be necessary according to the prescription. Trace down column, "Distance Power," then across table to column of "Cylinder Power" desired. The bold face figure in the intersecting space will indicate inner curve of the blank and the less prominent figure the curve of distance portion of toric tool required.

A copy of this table, printed on cardboard for shop use, will be mailed free on request.

−CYLINDER POWER

DISTANCE POWER +SPHERO	−.12	−.25	−.37	−.50	−.62	−.75	−1.00	−1.25	−1.50	−1.75	−2.00	−2.25	−2.50	−2.75	−3.00
+ .12	6 6 00 / 6 12	6 5 87 / 6 12	6 5 75 / 6 12	6 5 62 / 6 12	6 5 50 / 6 12	6 5 37 / 6 12	6 5 12								
+ .25	6 6 12 / 6 25	6 6 00 / 6 25	6 5 87 / 6 25	6 5 75 / 6 25	6 5 62 / 6 25	6 5 50 / 6 25	6 5 25 / 6 25	6 5 00 / 6 25	8 6 75 / 8 25	8 6 50 / 8 25	8 6 25 / 8 25	8 6 00 / 8 25	8 5 75 / 8 25	8 5 50 / 8 25	8 5 25 / 8 25
+ .37	6 6 25 / 6 37	6 6 12 / 6 37	6 6 00 / 6 37	6 5 87 / 6 37	6 5 75 / 6 37	6 5 62 / 6 37	6 5 37 / 6 37								
+ .50	6 6 37 / 6 50	6 6 25 / 6 50	6 6 12 / 6 50	6 6 00 / 6 50	6 5 87 / 6 50	6 5 75 / 6 50	6 5 50 / 6 50	6 5 25 / 6 50	6 5 00 / 6 50	8 6 75 / 8 50	8 6 50 / 8 50	8 6 25 / 8 50	8 6 00 / 8 50	8 5 75 / 8 50	8 5 50 / 8 50
+ .62	6 6 50 / 6 62	6 6 37 / 6 62	6 6 25 / 6 62	6 6 12 / 6 62	6 6 00 / 6 62	6 5 87 / 6 62	6 5 62								
+ .75	6 6 62 / 6 75	6 6 00 / 6 75	6 6 37 / 6 75	6 6 25 / 6 75	6 6 12 / 6 75	6 6 00 / 6 75	6 5 75 / 6 75	6 5 50 / 6 75	6 5 25 / 6 75	6 5 00 / 6 75	8 6 75 / 8 75	8 6 50 / 8 75	8 6 25 / 8 75	8 6 00 / 8 75	8 5 75 / 8 75
+1.00		6 6 75 / 7 00	6 6 62 / 7 00	6 6 50 / 7 00	6 6 37 / 7 00	6 6 25 / 7 00	6 6 00 / 7 00	6 5 75 / 7 00	6 5 50 / 7 00	6 5 25 / 7 00	6 5 00 / 7 00	8 6 75 / 9 00	8 6 50 / 9 00	8 6 25 / 9 00	8 6 00 / 9 00
+1.25		6 7 00 / 7 25		6 6 75 / 7 25	6 6 62 / 7 25	6 6 50 / 7 25	6 6 25 / 7 25	6 6 00 / 7 25	6 5 75 / 7 25	6 5 50 / 7 25	6 5 25 / 7 25	6 5 00 / 7 25	8 6 75 / 9 25	8 6 50 / 9 25	8 6 25 / 9 25
+1.50		6 7 25 / 7 50		6 7 00 / 7 50		6 6 75 / 7 50	6 6 50 / 7 50	6 6 25 / 7 50	6 6 00 / 7 50	6 5 75 / 7 50	6 5 50 / 7 50	6 5 25 / 7 50	6 5 00 / 7 50	8 6 75 / 9 50	8 6 50 / 9 50
+1.75		6 7 50 / 7 75		6 7 25 / 7 75		6 7 00 / 7 75	6 6 75 / 7 75	6 6 50 / 7 75	6 6 25 / 7 75	6 6 00 / 7 75	6 5 75 / 7 75	6 5 50 / 7 75	6 5 25 / 7 75	6 5 00 / 7 75	8 6 75 / 9 75
+2.00		6 7 75 / 8 00		6 7 50 / 8 00		6 7 25 / 8 00	6 7 00 / 8 00	6 6 75 / 8 00	6 6 50 / 8 00	6 6 25 / 8 00	6 6 00 / 8 00	6 5 75 / 8 00	6 5 50 / 8 00	6 5 25 / 8 00	6 5 00 / 8 00
+2.25		6 8 00 / 8 25		6 7 75 / 8 25		6 7 50 / 8 25	6 7 25 / 8 25	6 7 00 / 8 25	6 6 75 / 8 25	6 6 50 / 8 25	6 6 25 / 8 25	6 6 00 / 8 25	6 5 75 / 8 25	6 5 50 / 8 25	6 5 25 / 8 25
+2.50		4 6 25 / 6 50		6 8 00 / 8 50		6 7 75 / 8 50	6 7 50 / 8 50	6 7 25 / 8 50	6 7 00 / 8 50	6 6 75 / 8 50	6 6 50 / 8 50	6 6 25 / 8 50	6 6 00 / 8 50	6 5 75 / 8 50	6 5 50 / 8 50
+2.75		4 6 50 / 6 75		4 6 25 / 6 75		6 8 00 / 8 75	6 7 75 / 8 75	6 7 50 / 8 75	6 7 25 / 8 75	6 7 00 / 8 75	6 6 75 / 8 75	6 6 50 / 8 75	6 6 25 / 8 75	6 6 00 / 8 75	6 5 75 / 8 75
+3.00		4 6 75 / 7 00		4 6 50 / 7 00		4 6 25 / 7 00	6 8 00 / 9 00	6 7 75 / 9 00	6 7 50 / 9 00	6 7 25 / 9 00	6 7 00 / 9 00	6 6 75 / 9 00	6 6 50 / 9 00	6 6 25 / 9 00	6 6 00 / 9 00
+3.25		4 7 00 / 7 25		4 6 75 / 7 25		4 6 50 / 7 25	4 6 25 / 7 25	6 8 00 / 9 25	6 7 75 / 9 25	6 7 50 / 9 25	6 7 25 / 9 25	6 7 00 / 9 25	6 6 75 / 9 25	6 6 50 / 9 25	6 6 25 / 9 25
+3.50		4 7 25 / 7 50		4 7 00 / 7 50		4 6 75 / 7 50	4 6 50 / 7 50	4 6 25 / 7 50	6 8 00 / 9 50	6 7 75 / 9 50	6 7 50 / 9 50	6 7 25 / 9 50	6 7 00 / 9 50	6 6 75 / 9 50	6 6 50 / 9 50
+3.75		4 7 50 / 7 75		4 7 25 / 7 75		4 7 00 / 7 75	4 6 75 / 7 75	4 6 50 / 7 75	4 6 25 / 7 75	6 8 00 / 9 75	6 7 75 / 9 75	6 7 50 / 9 75	6 7 25 / 9 75	6 7 00 / 9 75	6 6 75 / 9 75
+4.00		4 7 75 / 8 00		4 7 50 / 8 00		4 7 25 / 8 00	4 7 00 / 8 00	4 6 75 / 8 00	4 6 50 / 8 00	4 6 25 / 8 00	6 8 00 / 10 00	6 7 75 / 10 00	6 7 50 / 10 00	6 7 25 / 10 00	6 7 00 / 10 00

+CYLINDER POWER

−SPHERO	+.12	+.25	+.37	+.50	+.62	+.75	+1.00	+1.25	+1.50	+1.75	+2.00	+2.25	+2.50	+2.75	+3.00
− .12	6 5 87 / 6 00	6 5 87 / 6 12	6 5 87 / 6 25	6 5 87 / 6 37	6 5 87 / 6 50	6 5 87 / 6 62	6 5 87 / 6 87								
− .25	6 5 75 / 5 87	6 5 75 / 6 00	6 5 75 / 6 12	6 5 75 / 6 25	6 5 75 / 6 37	6 5 75 / 6 50	6 5 75 / 6 75	6 5 75 / 7 00	6 5 75 / 7 25	6 5 75 / 7 50	6 5 75 / 7 75	6 5 75 / 8 00	6 5 75 / 8 25	6 5 75 / 8 50	6 5 75 / 8 75
− .37	6 5 62 / 5 75	6 5 62 / 5 87	6 5 62 / 6 00	6 5 62 / 6 12	6 5 62 / 6 25	6 5 62 / 6 37	6 5 62 / 6 62								
− .50	6 5 50 / 5 62	6 5 50 / 5 75	6 5 50 / 5 87	6 5 50 / 6 00	6 5 50 / 6 12	6 5 50 / 6 25	6 5 50 / 6 50	6 5 50 / 6 75	6 5 50 / 7 00	6 5 50 / 7 25	6 5 50 / 7 50	6 5 50 / 7 75	6 5 50 / 8 00	6 5 50 / 8 25	6 5 50 / 8 50
− .62	6 5 37 / 5 50	6 5 37 / 5 62	6 5 37 / 5 75	6 5 37 / 5 87	6 5 37 / 6 00	6 5 37 / 6 12	6 5 37 / 6 37								
− .75	6 5 25 / 5 37	6 5 25 / 5 50	6 5 25 / 5 62	6 5 25 / 5 75	6 5 25 / 5 87	6 5 25 / 6 00	6 5 25 / 6 25	6 5 25 / 6 50	6 5 25 / 6 75	6 5 25 / 7 00	6 5 25 / 7 25	6 5 25 / 7 50	6 5 25 / 7 75	6 5 25 / 8 00	6 5 25 / 8 25
−1.00	6 5 00 / 5 12	6 5 00 / 5 25	6 5 00 / 5 37	6 5 00 / 5 50	6 5 00 / 5 62	6 5 00 / 5 75	6 5 00 / 6 00	6 5 00 / 6 25	6 5 00 / 6 50	6 5 00 / 6 75	6 5 00 / 7 00	6 5 00 / 7 25	6 5 00 / 7 50	6 5 00 / 7 75	6 5 00 / 8 00
−1.25	8 6 75 / 6 87	8 6 75 / 7 00	8 6 75 / 7 12	8 6 75 / 7 25	8 6 75 / 7 37	8 6 75 / 7 50	8 6 75 / 7 75	8 6 75 / 8 00	8 6 75 / 8 25	8 6 75 / 8 50	8 6 75 / 8 75	8 6 75 / 9 00	8 6 75 / 9 25	8 6 75 / 9 50	8 6 75 / 9 75
−1.50	8 6 50 / 6 62	8 6 50 / 6 75	8 6 50 / 6 87	8 6 50 / 7 00	8 6 50 / 7 12	8 6 50 / 7 25	8 6 50 / 7 50	8 6 50 / 7 75	8 6 50 / 8 00	8 6 50 / 8 25	8 6 50 / 8 50	8 6 50 / 8 75	8 6 50 / 9 00	8 6 50 / 9 25	8 6 50 / 9 50
−1.75	8 6 25 / 6 37	8 6 25 / 6 50	8 6 25 / 6 62	8 6 25 / 6 75	8 6 25 / 6 87	8 6 25 / 7 00	8 6 25 / 7 25	8 6 25 / 7 50	8 6 25 / 7 75	8 6 25 / 8 00	8 6 25 / 8 25	8 6 25 / 8 50	8 6 25 / 8 75	8 6 25 / 9 00	8 6 25 / 9 25
−2.00	8 6 00 / 6 12	8 6 00 / 6 25	8 6 00 / 6 37	8 6 00 / 6 50	8 6 00 / 6 62	8 6 00 / 6 75	8 6 00 / 7 00	8 6 00 / 7 25	8 6 00 / 7 50	8 6 00 / 7 75	8 6 00 / 8 00	8 6 00 / 8 25	8 6 00 / 8 50	8 6 00 / 8 75	8 6 00 / 9 00
−2.25	8 5 75 / 5 87	8 5 75 / 6 00	8 5 75 / 6 12	8 5 75 / 6 25	8 5 75 / 6 37	8 5 75 / 6 50	8 5 75 / 6 75	8 5 75 / 7 00	8 5 75 / 7 25	8 5 75 / 7 50	8 5 75 / 7 75	8 5 75 / 8 00	8 5 75 / 8 25	8 5 75 / 8 50	8 5 75 / 8 75
−2.50	8 5 50 / 5 62	8 5 50 / 5 75	8 5 50 / 5 87	8 5 50 / 6 00	8 5 50 / 6 12	8 5 50 / 6 25	8 5 50 / 6 50	8 5 50 / 6 75	8 5 50 / 7 00	8 5 50 / 7 25	8 5 50 / 7 50	8 5 50 / 7 75	8 5 50 / 8 00	8 5 50 / 8 25	8 5 50 / 8 50
−2.75	8 5 25 / 5 37	8 5 25 / 5 50	8 5 25 / 5 62	8 5 25 / 5 75	8 5 25 / 5 87	8 5 25 / 6 00	8 5 25 / 6 25	8 5 25 / 6 50	8 5 25 / 6 75	8 5 25 / 7 00	8 5 25 / 7 25	8 5 25 / 7 50	8 5 25 / 7 75	8 5 25 / 8 00	8 5 25 / 8 25
−3.00	8 5 00 / 5 12	8 5 00 / 5 25	8 5 00 / 5 37	8 5 00 / 5 50	8 5 00 / 5 62	8 5 00 / 5 75	8 5 00 / 6 00	8 5 00 / 6 25	8 5 00 / 6 50	8 5 00 / 6 75	8 5 00 / 7 00	8 5 00 / 7 25	8 5 00 / 7 50	8 5 00 / 7 75	8 5 00 / 8 00
−3.25	9 5 75 / 5 87	9 5 75 / 6 00	9 5 75 / 6 12	9 5 75 / 6 25	9 5 75 / 6 37	9 5 75 / 6 50	9 5 75 / 6 75	9 5 75 / 7 00	9 5 75 / 7 25	9 5 75 / 7 50	9 5 75 / 7 75	9 5 75 / 8 00	9 5 75 / 8 25	9 5 75 / 8 50	9 5 75 / 8 75
−3.50	9 5 50 / 5 62	9 5 50 / 5 75	9 5 50 / 5 87	9 5 50 / 6 00	9 5 50 / 6 12	9 5 50 / 6 25	9 5 50 / 6 50	9 5 50 / 6 75	9 5 50 / 7 00	9 5 50 / 7 25	9 5 50 / 7 50	9 5 50 / 7 75	9 5 50 / 8 00	9 5 50 / 8 25	9 5 50 / 8 50
−3.75	9 5 25 / 5 37	9 5 25 / 5 50	9 5 25 / 5 62	9 5 25 / 5 75	9 5 25 / 5 87	9 5 25 / 6 00	9 5 25 / 6 25	9 5 25 / 6 50	9 5 25 / 6 75	9 5 25 / 7 00	9 5 25 / 7 25	9 5 25 / 7 50	9 5 25 / 7 75	9 5 25 / 8 00	9 5 25 / 8 25
−4.00	9 5 00 / 5 12	9 5 00 / 5 25	9 5 00 / 5 37	9 5 00 / 5 50	9 5 00 / 5 62	9 5 00 / 5 75	9 5 00 / 6 00	9 5 00 / 6 25	9 5 00 / 6 50	9 5 00 / 6 75	9 5 00 / 7 00	9 5 00 / 7 25	9 5 00 / 7 50	9 5 00 / 7 75	9 5 00 / 8 00

ULTEX ONEPIECE BIFOCAL DIRECTIONS

ONEPIECE Bifocal Lenses being made of one piece of glass, strain due to uneven expansion is eliminated and the possibility of breakage in grinding is reduced to a minimum. With strong addition, these lenses can be ground extremely thin and entirely free from color, or chromatic aberration.

Our blanks are regularly made in the following sizes:

B 47 mm round, with reading portion 19 mm round.

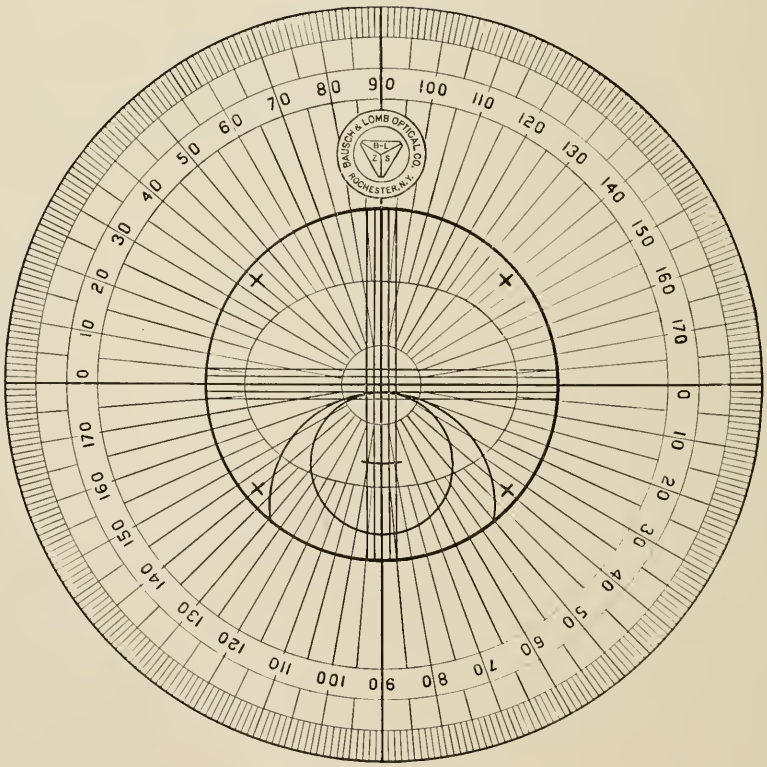
E 49 x 38 mm, with reading portion 30 x about 15 mm.

E Large 55 x 47 mm, with reading portion 30 x about 33 mm.

They are made in the deep curved form only and finished on the concave side.

Cylinders must be ground in convex toric. If cylinder is concave, transpose to convex.

When ordering blanks it is necessary to prefix the number of the blank by the designation "B," "E," or "E Large" to indicate size desired.



To select blank needed, refer to chart, trace down the column, "Sphero Distance Power," to the line indicating the distance power called for; then across the chart to the required reading addition; the figure in the intersecting space will show the number of blank to be used.

Tools—Onepiece Bifocal Lenses will focus accurately when surface ground on convex side with tools of B. & L. index, which must be kept true to curve.

Laying Out—Place on Protractor and dot around dividing line with red or white marking ink. Locate and dot the desired optical center of the distance portion. Inset as required by rotating the reading portion, using the optical center of the distance portion as a center of rotation. Rotate to the right or left as inset is required, five degrees for each millimeter of inset. If cylinder is to be added, dot the axis. An allowance of 1.5 mm above the dividing line is recommended for center of distance portion, all of our blanks being cut to this allowance. Protractors for laying out, surfacing and edging blanks furnished on request.

Marking—Locate and mark measuring points equidistant from center, as indicated on protractor. When marked, chipping before surfacing is unnecessary. If prisms are required, lay outline for direction of prisms and measure thickness on this line.

Blocking—Use B. & L. iron bodies, 47 mm diameter, and B. & L. pitch. Pitch should be of uniform thickness, not less than 3 mm between lens and body. Heat slowly and evenly to avoid over-heating.

Roughing—Rough the blank to the required thickness with B. & L. roughing emery, allowing 0.2 millimeter for smoothing, and measure thickness at markings frequently to avoid grinding prismatically. If opposite points measure alike, optical center will be in correct position. Do not measure on the reading portion, as lens is thicker at this part. It is necessary to use B. & L. smoothing emery for second grinding before using the finishing emery. B. & L. extra fine finishing emery is for high finish only and is not intended to remove stock.

Polishing—Use B. & L. best quality thin polishing felt and B. & L. wet ground polishing compound (Rouge).

EYEGLASS FRAMES, MAGNIFIERS AND READERS

THE manufacture of Eyeglass Frames of black and shell-colored zylonite dates back to the very early days of our business. Coupled with the intervening years of experience and the fact that this material lends itself so admirably to optical requirements, our product has been accepted in both American and European markets as the quality standard.

Magnifiers were among our earliest products. They are the result of many years of development and are suitable for a great variety of purposes. They are very generally used in school work by naturalists, inspectors of cloth and other articles, seedsmen, fruit growers, nurserymen, detectives, and in many other vocations.

Rubber Magnifiers are made in oval and bellows shape, with one, two and three lenses, allowing a considerable range of magnifications. The best quality of vulcanized rubber is used in the mounting, giving durability combined with light weight and neat appearance.

The **Nickeled Magnifiers** differ from the preceding chiefly in mounting. They are attractively nickeled and furnished only in the bellows shape. The rim is drawn securely about the lens by a ball joint, which serves also as a means of opening the magnifier.

The **Doublet Magnifiers** also have nickel metal mounting. They consist of two separated plano-convex lenses and are ground and polished to give satisfactory results for medium power magnifications. Lenses of this type are frequently offered under the name of Coddington Magnifiers, but they are not of that construction.

Coddington Magnifiers give a good definition and a wide field. They are composed of a cylinder of glass with a deep groove cut in at an equal distance from the ends to serve as a diaphragm. The ends of this cylinder are ground spherically and polished to form the lens surfaces.

Triple Aplanats are composed of two meniscus lenses of flint glass, separated by a double convex lens of crown glass. The field of these magnifiers is large and has a perfect correction for chromatic aberration as well as for flatness, astigmatism and distortion. Their working distance is little short of a simple lens of the same equivalent focal length.

Hastings Aplanatic Triplet Magnifiers are made after formulæ by Prof. Hastings, of the Sheffield School, Yale University. They are among the most perfect magnifiers produced, with a high correction always appreciated by scientists. The angle of view embraced is very large and the working distance almost equal to that of a single lens of the same focus.

Watchmakers' Glasses are used in the trades and are also popular with botany and zoology students. While all are easily held in the orbit of the eye, leaving the hands free, one style (No. 144 L. P.) is made with a detachable spring to pass around the head and hold the glass in position for more extended observations. Another (No. 144 A) is fitted with two lenses, one of which is removable, giving two different foci and magnifications. All styles have vulcanized rubber mountings, with black or ivory finish.

Engravers' Glasses are designed particularly for engravers, carvers and die cutters. Their large clear field, however, renders them valuable for large dissections in biological work, for retouching and for use as condensers. All styles are furnished in vulcanite mountings.

Bank Note Detectors are specially designed for government and bank officials for the examination of currency, signatures, etc., but they can be used to good advantage wherever a perfectly corrected magnifier is required. The lenses are achromatic, give a large clear field and high magnifications.

Too much emphasis can scarcely be laid upon the quality of our **Reading Glasses.** They are unsurpassed, we believe, in optical properties, design and workmanship. The lenses are accurately ground of clear white optical glass and highly polished. While giving comparatively low magnifications, they cover a wide field. We offer three styles of rims and handles: Nickeled rim and ferrule with ebonized wood handle, nickeled rim with ivory-finished ferrule and handle and ivory-finished throughout.

The rims are of sufficient width to protect the lens surfaces. We apply a special process for attaching the ferrules to the handles, which renders it impossible for them to work loose. The handles are securely screwed to the rims, being thus easily removable though strongly attached.

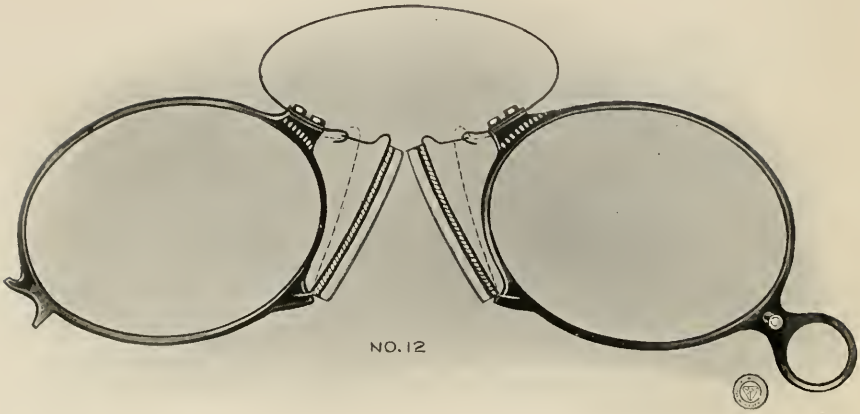
Semi-Achromatic Reading Glasses are offered for those desiring readers of a better correction than is afforded by a single lens. They are made of two plano-convex lenses, corrected to eliminate chromatic and spherical aberration to a certain extent. They are furnished with nickel rim and ebonized handle.

Our **Reducing Glasses** consist of double concave lenses of the same quality as our readers and are made in nickel rim with ebonized handles. They are used by artists and engravers to reduce drawings, photographs, etc.

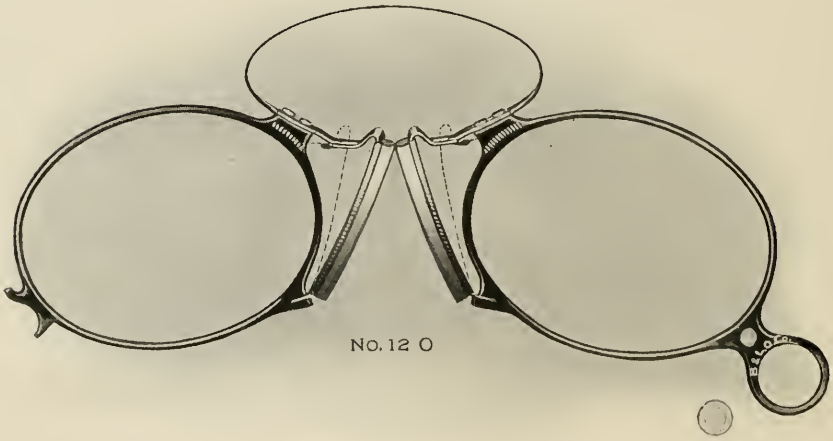
A general demand has arisen for a convenient stand to hold reading glasses of different diameters. Our **Reading Glass Holder** has been designed for this purpose and is most effective in displaying our line. It will hold six readers, from 2 to 6 inches in diameter, and for a display article is most attractive.

We have constructed two forms of **Magnifier Holders.** While they are designed especially for use in dissections, they are equally valuable wherever it is desirable to use a magnifier, with the hands free. (See page 146.)

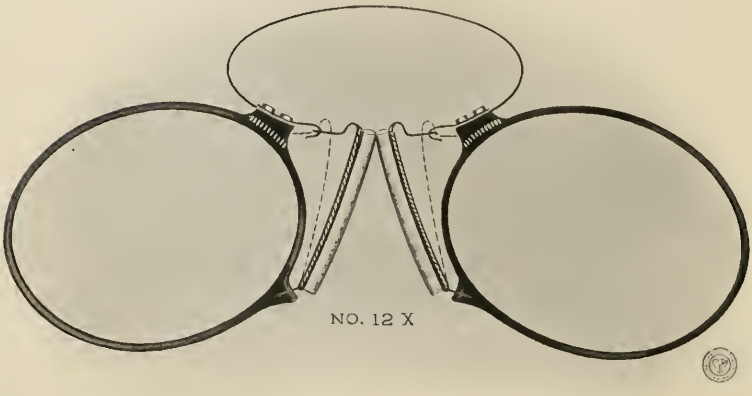
EYEGLASS FRAMES



NO. 12



No. 12 O



NO. 12 X

EYEGLASS FRAMES

THESE Eyeglass Frames are made in black and shell colored Zylonite of an extra fine finish with adjustable cork guards. They are recommended where the elimination of glaring reflection effects of the edges is desired. They are supplied in 1, 0 and 00 eye sizes.

Black Frames are regularly supplied with blue springs, and shell colored frames with bronze springs.

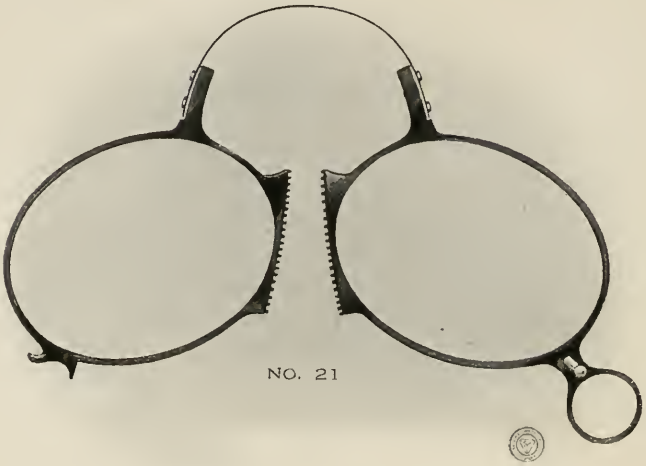
Style No.	Frames	Per Dozen		
		1 Eye	0 Eye	00 Eye
12	Black Zylonite, with handle, adjustable cork guard	$3.00	$3.25	$3.50
12 O	Black Zylonite, with handle, adjustable cork offset guard	3.00	3.25	3.50
12 X	Black Zylonite, no handle, adjustable cork guard	3.00	3.25	3.50
12 XO	Black Zylonite, no handle, adjustable cork offset guard	3.00	3.25	3.50
12 Z	Shell Zylonite, with handle, adjustable cork guard	3.00	3.25	3.50
12 ZO	Shell Zylonite, with handle, adjustable cork offset guard	3.00	3.25	3.50
12 XZ	Shell Zylonite, no handle, adjustable cork guard	3.00	3.25	3.50
12 XZO	Shell Zylonite, no handle, adjustable cork offset guard	3.00	3.25	3.50

EYEGLASS MATERIAL

Style No.	Material	Per Dozen		
		1 Eye	0 Eye	00 Eye
12	Handles	$1.50	$1.60	$1.75
12 X	Handles	1.50	1.60	1.75
12 Z	Handles	1.50	1.60	1.75
12 XZ	Handles	1.50	1.60	1.75
12	Left	1.25	1.35	1.50
12 X	Left	1.25	1.35	1.50
12 Z	Left	1.25	1.35	1.50
12 XZ	Left	1.25	1.35	1.50

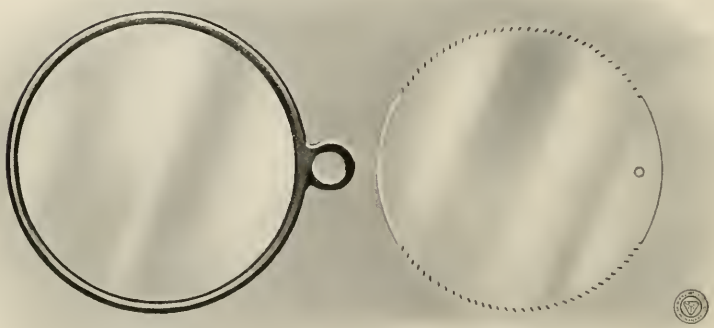
Style No.	Material	Per Dozen
12	Springs, blue or bronze	$0.15
12	Guards, cork	.40
12 O	Guards, offset	.40
12	Hangers, blue or bronze	.10
12 O	Hangers, blue or bronze offset	.10
12	Screws, blue, long	.10
12	Screws, blue, short	.10
	Catch Pins	.15

EYEGLASS FRAMES AND MONOCLES



NO. 21

NO. 31½



NO. 40–40 Z

NO. 42

EYEGLASS FRAMES AND MATERIAL

THESE Frames are made to meet the demand for a simplified form of eyeglass. The frames are of good finish, and the complete eyeglasses are mounted with double convex lenses. No. 21 has rigid guard, No. 31½ has cork guard; both are made in one eye size only. (See page 134.)

Catalog No.		Per Dozen					
		Eyeglasses	Frames	Handles	Lefts	Springs	Guards
21	Black Zylonite	$2.00	$1.50	$1.00	$0.75	$0.15	
31½	Black Zylonite	2.75	2.25	1.25	1.00	.25	$0.15

MONOCLE GLASSES

(For illustration see page 134)

Catalog No.	Old Catalog No.	Description	Per Dozen	
			Frames	Fitted with Plano Lenses
40	40	Black Zylonite, Small ring handle	$1.50	$2.25
41	40 Z	Shell Zylonite, Small ring handle	1.50	2.25
42	40	Rimless		1.00

EYEGLASS HOOKS

Catalog No.	Old Catalog No.	Description	Per Dozen
45	175	Black Zylonite, Small Size	$1.25
46	176	Black Zylonite, Large Size	1.50
48	175 Z	Shell Zylonite, Small Size	1.25
49	176 Z	Shell Zylonite, Large Size	1.50

FOLDING MAGNIFIERS

HARD RUBBER AND ZYLONITE MOUNTINGS

NO. 51–79

NO. 50–78

NO. 103–121

NO. 101–119

NO. 102–120

FOLDING MAGNIFIERS

HARD RUBBER AND ZYLONITE MOUNTINGS

Catalog No.	Code	Shape	Diameter in mm	Magnification ×	Price Per Dozen
50	Lass	Oval	20	5.0	$3.00
56	Labor	Oval	25	4.0	3.75
62	Lacerta	Oval	30	3.5	5.00
68	Lackey	Oval	37	3.0	6.00
74	Lactant	Oval	44	2.5	7.50
78	Lactone	Oval	50	2.0	9.00
51	Lab	Oval	15 and 20	5.0 to 10	4.50
57	Lace	Oval	20 and 25	0.4 to 8	6.00
63	Lacing	Oval	25 and 30	3.5 to 7	7.50
69	Lactage	Oval	30 and 37	3.0 to 6	9.00
75	Lactine	Oval	37 and 44	2.5 to 5	12.00
79	Lactyl	Oval	44 and 50	2.0 to 4	15.00
56 Z I	Langral	Oval	25	4.0	4.50
62 Z I	Language	Oval	30	3.5	6.00
101	Lacuna	Bellows	18	6.0	3.00
110	Ladkin	Bellows	20	5.0	3.50
119	Lagena	Bellows	25	4.0	4.00
102	Lad	Bellows	15 and 18	6 to 12	4.50
111	Ladrone	Bellows	18 and 20	5 to 10	5.25
120	Lagoon	Bellows	20 and 25	4 to 8	6.00
103	Lading	Bellows	12, 15 and 18	6 to 20	6.00
112	Laft	Bellows	15, 18 and 20	5 to 15	7.50
121	Laical	Bellows	18, 20 and 25	4 to 10	9.00

NICKELED METAL MOUNTINGS

(For illustrations see page 138)

101 NK	Lama	Bellows	20	5.0	$4.50
110 NK	Laminar	Bellows	25	4.0	5.00
119 NK	Lander	Bellows	30	3.5	5.50
102 NK	Lambda	Bellows	20	5 to 10	6.00
111 NK	Lampate	Bellows	25	4 to 8	6.75
120 NK	Lang	Bellows	30	3 to 6	7.50
103 NK	Lames	Bellows	20	4 to 16	9.00
112 NK	Lance	Bellows	25	3 to 12	10.50
121 NK	Langate	Bellows	30	2 to 8	12.00

FOLDING MAGNIFIERS
NICKELED METAL MOUNTINGS

NO. 101 NK – 119 NK

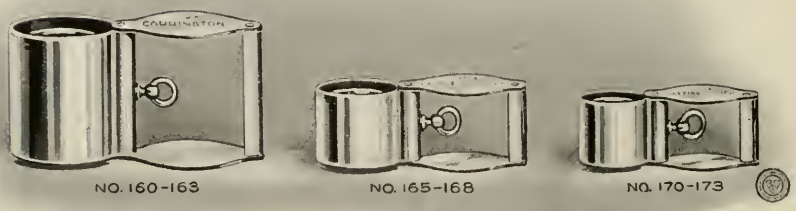
NO. 102 NK – 120 NK

NO. 103 NK – 121 NK

DOUBLETS

NO. 137 NO. 136

CODDINGTONS AND TRIPLETS



NO. 160-163 NO. 165-168 NO. 170-173

HAND MAGNIFIERS

DOUBLETS

Catalog No.	Old Catalog No.	Code	Diameter in mm	Magnification ×	Price Per Dozen
136	6	Laticlave	12	10	$7.50
137	7	Latimer	12	10	9.00

CODDINGTONS

	160	Land	12	20	13.50
	161	Launce	15	15	15.00
	162	Launder	20	10	16.50
	163	Laurate	25	5	18.00

TRIPLE APLANATS

	165	Laurel	10	20	45.00
	166	Laurus	12	15	45.00
	167	Laveret	15	10	45.00
	168	Laveer	20	8	45.00

HASTINGS APLANATIC TRIPLETS

	170	Lawnd	7	20	90.00
	171	Laxity	10	15	90.00
	172	Layer	12	10	90.00
	173	Lazar	15	7	90.00

BANK NOTE DETECTORS

(For illustration see page 140)

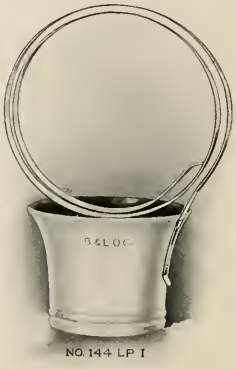
	180	Lazaret	25	10	90.00
	181	Laze	30	8	86.00
	182	Lazily	35	6	82.00
	183	Lazy	40	5	78.00

WATCHMAKERS' AND ENGRAVERS' GLASSES

NO. 144

NO. 144 I

NO. 144 LP


NO. 144 LP I

NO. 144½

NO. 144 A

NO. 146 NO. 148 A
NO. 146 NO. 148 A

NO. 180 NO. 183

BANK NOTE DETECTOR

WATCHMAKERS' AND ENGRAVERS' GLASSES

Our Watchmakers' Glasses are furnished in either black or white ivory finish. The letter "I," added to the catalog numbers below, indicates the ivory finish.

Catalog No.	Code	Diameter in mm	Magnification	Price Per Dozen
144-2	Lapis	25	7 to 10	$4.50
144-2	Lapling	25	3 to 5	3.00
144-2	Lapp	25	2 to 3	2.75
144-3	Larch	30	3 to 5	3.50
144-3	Lard	30	2 to 3	3.00
144-2 I	Larderer	25	7 to 10	5.25
144-2 I	Lardery	25	3 to 5	3.75
144-2 I	Lardoon	25	2 to 3	3.50
144-3 I	Lardry	30	3 to 5	4.25
144-3 I	Lare	30	2 to 3	3.75
144½	Layiat	12	10	3.50
144½ I	Laying	12	10	4.25
144 a	Larget	12 and 25	4 and 7	5.25
144a I	Largish	12 and 25	4 and 7	6.00
144-2 LP	Lippet	25	3 to 5	4.50
144-2 LP	Lappic	25	2 to 3	4.25
144-3 LP	Larder	30	3 to 5	5.00
144-3 LP	Lardon	30	2 to 3	4.50
144-2 LPI	Largo	25	3 to 5	5.25
144-2 LPI	Lariat	25	2 to 3	5.00
144-3 LPI	Larine	30	3 to 5	5.75
144-3 LPI	Lark	30	2 to 3	5.25

ENGRAVERS' GLASSES

146	Larva	40	3.5	13.50
148	Lascions	50	2.5	18.00
146a	Lasket	40	3.5	6.75
148a	Latchet	50	2.5	9.00

READING GLASSES

READING GLASSES

Our readers are of the best quality of material and workmanship. The lenses are double convex, accurately ground from clear white glass and highly polished. Their magnifications are calculated to give the clearest possible field for their respective diameters.

We make three styles as follows: Nickel rim and ferrule with black handle, nickel rim with ivory finish ferrule and handle (I. H.), and of ivory finish throughout — rim, ferrule and handle (I).

Catalog No.	Code	Lens Diameter	Focus	Price Per Dozen
200	Legume	2 inches	5 inches	$4.50
202	Leipoa	2½ inches	6 inches	5.75
204	Leister	3 inches	7 inches	6.75
206	Leman	3½ inches	8 inches	9.00
208	Lemma	4 inches	10 inches	12.00
209	Lemur	4½ inches	12 inches	15.00
210	Lena	5 inches	13 inches	18.00
211	Lenitive	5½ inches	14 inches	22.50
212	Lentical	6 inches	15 inches	27.00
200 III	Lere	2 inches	5 inches	5.00
202 III	Lered	2½ inches	6 inches	6.25
204 III	Lerot	3 inches	7 inches	7.50
206 III	Les	3½ inches	8 inches	10.50
208 III	Lesion	4 inches	10 inches	13.50
209 III	Lest	4½ inches	12 inches	17.00
210 III	Let	5 inches	13 inches	20.25
211 III	Letch	5½ inches	14 inches	25.25
212 III	Lethe	6 inches	15 inches	30.00
200 I	Lethy	2 inches	5 inches	5.75
202 I	Letoff	2½ inches	6 inches	7.50
204 I	Letter	3 inches	7 inches	9.00
206 I	Levite	3½ inches	8 inches	12.50
208 I	Lettish	4 inches	10 inches	16.50
209 I	Letts	4½ inches	12 inches	20.75
210 I	Lettuce	5 inches	13 inches	24.75
211 I	Letup	5½ inches	14 inches	30.50
212 I	Level	6 inches	15 inches	36.00

READING AND REDUCING GLASSES

Semi-Achromatic readers have two plano-convex lenses, instead of the single double convex lens. This affords better correction and eliminates chromatic and spherical aberration to a certain extent.

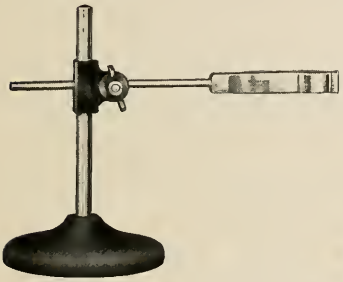
Our Reducing Glasses consist of double concave lenses. They are used by artists and engravers to reduce drawings, photographs and other illustrations.

Semi-Achromatic readers and reducing glasses are made in one style of finish only, nickel rim and ferrule with black handle.

Catalog No.	Code	Description	Lens Diameter	Focus	Price Per Dozen
		Reading Glasses, Semi-Achromatic			
200 A	Lentigo	2 Plano-Cx. Lenses	2 inches	5 inches	$ 9.00
202 A	Lentoid	2 Plano-Cx. Lenses	2½ inches	6 inches	11.25
204 A	Lepal	2 Plano-Cx. Lenses	3 inches	7 inches	13.50
206 A	Lepid	2 Plano-Cx. Lenses	3½ inches	8 inches	18.00
208 A	Lepra	2 Plano-Cx. Lenses	4 inches	10 inches	22.50
		Reducing Glasses			
200 cc	Leful	Double Cc. Lenses	2 inches	5 inches	6.00
202 cc	Legate	Double Cc. Lenses	2½ inches	6 inches	7.50
204 cc	Leger	Double Cc. Lenses	3 inches	7 inches	9.00
206 cc	Legion	Double Cc. Lenses	3½ inches	8 inches	12.00
208 cc	Legist	Double Cc. Lenses	4 inches	10 inches	15.00

Reading Glass Holder, No. 240

Reading Glass Holder, No. 240-1



Magnifier Holder, TU

Magnifier Holder, TUS

READING GLASS HOLDER

(For illustrations see page 145)

Catalog No.	Code	Description	Price Per Dozen
240	Leptus	Black Ebonized Wooden Base with holes for Six Readers	$9.00
240 I	Latching	Ivory Finish Base with holes for Six Readers	9.00

MAGNIFIER HOLDERS

(For illustrations see page 145)

We offer two stands differing in their scope and adjustment. The **TU** has a metal base, 98 mm in diameter, and height of 172 mm. The lens arm is of one piece with spring clamp at end, which will hold any lens not more than 38 mm in diameter, with vertical and lateral adjustments. The **TUS** has a base of heavy metal, 122 mm diameter, with a round metal pillar measuring 95 mm from top to base. The lens arm is in three parts, with three joints, attached to a triangular post by a strong joint with broad bearing surface. The spring clamp will hold lenses not exceeding 38 mm in diameter. Adjustment is by rack and pinion.

Catalog No.	Code	Description	Price Each
TU	Avel	Adjustable Stand	$3.00
TUS	Avena	Adjustable Stand	9.00

TRADE MARK FINDER

(For illustration see page 145)

This magnifier was especially designed, as its name implies, to facilitate the finding of our trade mark, which is engraved on several of our high-grade lenses and of which mention is made in the preceding pages. All optometrists and opticians, who use our Ultex Onepiece Bifocal and Punktal lenses, should have one, as it enables them to verify our product. One end of the finder is arranged to hold the lens securely in place while under observation.

Catalog No.	Code	Description	Price Each
245	Latchkey	Ivory Finish Mounting.	$2.50

CO-OPERATIVE SERVICE

Our Scientific Bureau and Advertising Department are at the constant service of our patrons for educational and publicity purposes. Various pieces of literature, of a technical or advertising value, are frequently published for the benefit of those oculists, optometrists and opticians who request them.

To render the truest service and sell the highest grade goods it is necessary to educate the public to the real advantages of such goods. That is the aim of our co-operative advertising service. Our different folders and signs are scientifically correct in copy and illustration, yet simple and interesting enough to convince the average layman. They are furnished in reasonable quantities free of charge—the folders and booklets imprinted with the business card of the individual optometrist or optician requesting them, and of a convenient size for enclosing in the ordinary letter envelope.

SCIENTIFIC AND TECHNICAL PUBLICATIONS

Pamphlet No. 1. "The Eye and the Lens."
Pamphlet No. 2. "The Substitution of Meniscus for Flat Ophthalmic Lenses and a New System of Designating their Powers."
Pamphlet No. 3. "Location of the Ophthalmic Lens before the Eye and Its Correcting Power."
Pamphlet No. 4. "Large Gullstrand Ophthalmoscope with Electric Illumination for the Examination of the Fundus Oculi with Stereoscopic Effect."
Pamphlet No. 5. "Punktal Lenses, Their Advantages and Application to Present Day Methods."
Pamphlet No. 6. "The Significance of Punktal Lens Principles in Application to the Eye."
Pamphlet No. 7. "The Vertex Dioptrometer—Its Principles and Usage."
Pamphlet No. 8. "The Keratometer, Interpupillary Distance Gauge and Exophthalmometer."
Pamphlet No. 9. "Spectrum Projection and Its Application to Ophthalmic Practice."
(Others to follow.)

ADVERTISING AIDS

FOLDERS

"Punktal Lenses."
"Toric and Meniscus Lenses."
"Ultex Onepiece Bifocals."
"Kryptok Bifocals."
"Stereo Prism Binoculars."
"Reading Glasses."
"Magnifiers and Readers."
"Watchmakers' Glasses."

NEWSPAPER ELECTROS

"Kryptok Bifocals."
"Stereo Prism Binoculars."
(Others to Follow.)

CHARTS

"Ophthalmic Lens Chart — Showing Comparative Fields of Deep Curved and Flat Lenses. (See page 34.) (Wall and Desk Sizes.)"

DISPLAY SIGNS

"Punktal Lenses."
"Toric and Meniscus Lenses (Window and Counter Sizes.)"
"Stereo Prism Binoculars."

BOOKLETS

"Stereo Prism Binoculars."
"Magnifiers and Readers."

OTHER PUBLICATIONS

In addition to our co-operative service already outlined we issue catalogs, booklets and circulars on the following products of our manufacture:

Microscopes and Accessories
Microtomes
Ophthalmic Apparatus
Photographic Lenses and Shutters
Projection Apparatus. (Balopticons and Accessories)
Photomicrographic Apparatus
Engineering Instruments. (Transits, Levels, etc.)
Range Finders and Gun Sights for Army and Navy
Equatorial Telescopes
Field and Opera Glasses (Stereo Prism Binoculars)
Magnifiers and Readers
Centrifuges
Laboratory Glassware
Bacteriological Apparatus

Zeiss Scientific Instruments

We shall be glad to mail any of this literature upon request. To dealers interested in promoting the sale of any of these lines we are also prepared to furnish a co-operative service in the form of imprinted circular matter for distribution, advertising electros, display signs, etc.

The following instructive publications will be found of particular value to users of the different instruments indicated by the titles:

BOOKLET—"Use and Care of the Microscope."
BOOKLET—"Use and Care of the Microtome."
BOOKLET—"Useful Tables for the Photographer."
BOOKLET—"The Microscopical Determination of the Properties of Minerals."
MANUAL—"Metro Manual." (For Engineers.)
CHART—Illustrating Parts of Compound Microscope Diagramatically." (Wall Size.)
BOOK—"Manipulation of the Microscope," by Edward Bausch. Cloth bound; price, $1.00.

All of these publications, except the last named, are sent free upon request.

PRESCRIPTION BLANK

Our prescription blank, described on page 49, can be supplied, if desired, with the protractor scale graduated to the American Standard, as well as the International Standard illustrated on page 48.

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